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Region V
230 South Dearborn
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EPA

Environmental Impact Statement

Final

Alternative Waste Treatment Systems for Rural Lake Projects

Case Study Number 1
Crystal Lake Area Sewage Disposal Authority
Benzie County, Michigan

EPA-5-MI-BENZIE-CRYSTAL LAKE-LA-80

FINAL ENVIRONMENTAL IMPACT STATEMENT

ALTERNATIVE WASTEWATER TREATMENT SYSTEMS FOR RURAL LAKE PROJECTS

CASE STUDY No. 1: CRYSTAL LAKE AREA SEWAGE DISPOSAL AUTHORITY

BENZIE COUNTY, MICHIGAN

Prepared by the

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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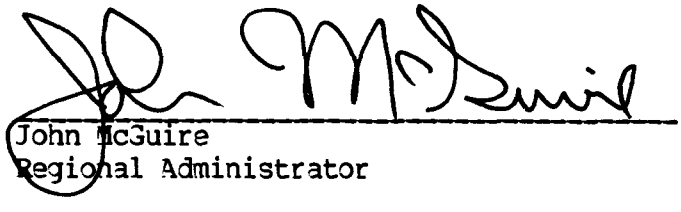

John McGuire
Regional Administrator

July 1980

LIST OF PREPARERS

This Final Environmental Impact Statement was prepared by WAPORA, Inc. under the guidance of Alfred Krause, EPA Region V Project Officer. Mr. Gerald Peters, Jr. was WAPORA's Project Manager. Mr. Ted Rockwell, EPA Region V, contributed to its preparation.

Significant input to the Draft EIS was provided by WAPORA employees and subcontractors, listed in that document.

EXECUTIVE SUMMARY

Background

The 1979 Draft Environmental Impact Statement (DEIS) on Alternative Wastewater Treatment for Rural Lake Projects, Crystal Lake area was concerned with a number of issues raised by the November 1976 Facilities Plan. That Plan proposed construction of a sewage collection system around all of Crystal Lake, excepting Beulah and including Benzonia, with discharge to a central wastewater treatment plant at Frankfort. The issues included: the high cost of centralized collection and treatment (present worth costs of $18.4 million) uncertain water quality impacts or improvements in Crystal Lake, adverse economic impacts to area residents, and uncertain induced growth and other secondary impacts.

To examine these issues USEPA used a variety of water quality modeling and sensing techniques. These included a door-to-door sanitary survey of about 25% of shoreline systems, aerial photographic survey of surface malfunctions, and a special septic leachate survey of the entire lake shoreline.

These studies found that although many on-site treatment systems did not comply with the sanitary code, only a few were having any impact on the water quality. Modeling indicated that no possible alternative would have a significant effect on lake water quality or trophic status. All suggested that the only major lake impact posed by the existing systems was the occasional shoreline concentrations of Cladophora algae. It was also clear that there were definitely water quality problems in Betsie Lake caused by the existing primary treatment plants at Frankfort and Elberta.

A wide range of alternatives was developed and evaluated. These ranged from highly centralized (the Facilities Plan Alternative and some variants) to composite to largely decentralized (Limited Action and No-Action). All but No-Action were similar in providing a single replacement plant to serve Frankfort and Elberta. The composite alternatives proposed varying mixtures of entirely on-site system maintenance and upgrading, partial sewering, and cluster treatment systems for the Crystal Lake shoreline. Costs ranged from $18.4 million for the Facilities Plan Alternative to $7.44 million for the Limited Action Alternative which would only serve the Crystal Lake shoreline by on-site maintenance and upgrading on cluster systems.

No-action was rejected for the Crystal Lake area because of localized shoreline water quality and the existence of some conditions indicating long-term treatment failure potential for the more poorly designed and installed systems. The various alternatives' impacts differed greatly only in overall and local costs. The EIS recommended the Limited Action Alternative, which offered generally comparable water quality impacts at a much lower cost than any other alternative.

Comments and Impacts

After the June 1979 publication of the Draft EIS, a Public Hearing was held

on August 6, 1979 in Frankfort. Several hundred people attended, and a large variety of comments was received, most of them in writing. These comments dealt with a number of subjects:

- o questioning costs - particularly operation and maintenence (O&M) and site-by-site study costs
- o questioning general construction costs
- o asking clarification of management proposals for the recommended alternative
- o expressing concern about non-point sources of water quality input, especially in view of the limited role of on-site treatment systems

Response:

After the close of the comment period USEPA responded in two different phases. The first involved several additional studies of Crystal Lake and lasted about four months. These studies include:

a. Survey of groundwater flow patterns around Crystal Lake to replace the hypothetical flow estimations in the Draft.

b. A septic leachate survey of Cold Creek to detect possible nutrient loading sources.

c. A detailed three dimensional survey (the "aquatic productivity study") of five sample effluent plumes entering the lake, including a complete survey of aquatic plants and algae.

The second phase was concerned with clarifying Federal, State and local administrative questions about formation of an on-site Wastewater Management District to maintain the on-site treatment systems. This work produced the following results:

- o Michigan DNR assigned separate funding priorities to the Frankfort/ Elberta and Crystal Lake portions of the project. This would allow each portion to procede at its own pace.
- o Michigan DNR reviewed the NPDES permit standards for Betsie Lake in light of new water quality data.
- o USEPA developed a new regional standard for project needs documentation requirements and the relationship to the various steps of the cost and complexity of work.
- o Both Michigan DNR and USEPA worked on methods to reduce the cost and complexity of detailed site work and to expedite processing of innovative and alternative grant applications.

- o USEPA developed a variety of approaches to simplify easement access requirements. This process, which is still going on, could altogether eliminate the expense and complexity of easement acquisition.

USEPA also prepared detailed costing and a work plan for the site-by-site survey for future Small Waste Flows District operation and maintenence, and local costs associated with the No-Action alternative. We than combined the full range of comments and developed responses or revisions of the draft.

The Final EIS

The result, this final EIS, is considerably shorter than the draft. Elements which were discussed at considerable length in the draft are summarized here, with emphasis on the new studies, response to comments and explanation of management procedures and costs. This is consistent with The Council on Environmental Quality's (CEQ) new National Environmental Policy Act (NEPA) regulations that became effective after the draft was completed.

Results

The general effect of the new studies was to confirm the earlier ones. The groundwater flow survey clarified the flow pattern projected in the draft. The new aquatic productivity suggests that under extreme conditions the septic tank systems might contribute the same 6.7 percent of lake phosphorus loads projected in the DEIS. The Cold Creek survey suggested that almost all of the dry-weather nutrient load was coming from the small tributary that parallels US 31 above the retention basin.

Similarily, the various administrative changes and developments did not greatly change information or assumptions. Revision of Betsie Lake effluent limitations impact BOD and phosphorus loads by less than 2 percent. Revisions in planning of the site-by-site work limit substantial increase in local costs. Simplification of current easement requirements may reduce costs.

Impact of the new costing studies is also limited; operation and maintenence were deliberately costed on a very conservative basis, as was the site-by-site study work. Together these increased annual costs for the Limited Action Alternative from $49 to $95 yearly for newly sewered areas of Crystal Lake ($82 without amortization of local capital cost shares). Twenty year present worth costs increase from $7.44 to $7.88 million. This modest increase does not come near changing the ranking of alternatives.

The comments, too, have produced some changes. The Village of Beulah does not have any serious plans for expanding its treatment capacity, largely eliminating any possibility for collection of the northeast shore. Other comments have led to substantial expansion and clarification of sections of the draft and appendices, such as a detailed description of the aerial photo-survey techniques. None of these, however, substantially alters the nature or ranking of alternatives.

Recommendations

The recommended action, therefore, remains basically as it was in the Draft EIS.

- o construction of connecting sewers and a new 0.33 mgd rotating biological contractor plant to serve Frankfort and Elberta;
- o sewer system evaluation surveys and rehabilitation of the existing sewers in Frankfort and Elberta;
- o design and implementation of a small waste flow district for the remainder of the Study Area;
- o site-specific environmental and engineering analyses of existing on-site systems in the unsewered parts of the proposed service area;
- o repair and replacement of on-site systems as required; and
- o cluster systems or other off-site treatment for portions of the northeast and southeast shorelines.

Should the applicant wish to proceed with this action, we strongly recommend that careful consideration be given to the sections on Management and Implementation which discuss the nature and advantages of many of the choices available. It is also important to begin to develop the management structure that will operate in the future - so that citizens and local officials can themeselves take part in the site-by-site design treatment choices. This will allow all concerned to become familiar with the procedures which will be needed to maintain and improve area water quality in the future.

C O N T E N T S

F I G U R E S

T A B L E S

Chapter I

PURPOSE OF AND NEED FOR ACTION

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

The "Crystal Lake Area Facility Plan - Wastewater Collection and Treatment" recommended construction of the facilities which will be described later in this chapter. The proposed wastewater facilities would be in the City of Frankfort, the Villages of Beulah, Elberta and Benzonia, and the Townships of Benzonia, Crystal Lake and Lake. These communities make up the Facility Planning Area, approximately one-fifth of Benzie County, in the northern part of the Lower Peninsula on the eastern shore of Lake Michigan. The estimated year-round population of the areas proposed for sewering (i.e., the Proposed Service Area) is 4,400, increasing to about 8,300 in the vacation season. Figure I-1 shows the project location within the State of Michigan. Figure I-2 delineates the Study Area.

The December 1976 Crystal Lake Area Facility Plan was completed and submitted to EPA by the Benzie County Department of Public Works. The facility plan, proposing construction of new wastewater collection and treatment facilities, was developed for the Crystal Lake Area Sewage Disposal Authority by three consulting firms: Williams and Works, Inc., the lead consultant; McNamee, Porter and Seeley; and Perla-Stout Associates.

The Crystal Lake Area Facility Plan reviewed existing data on water quality problems in Crystal Lake and the quality of surrounding groundwater, as well as information on site conditions such as soil types around the lake. The Facility Plan concluded that data on high water tables, small lots and poor soil provided sufficient evidence to link on-site systems to subsequent water quality problems and, therefore, to warrant sewering the Crystal Lake shoreline.

The four major issues which the EIS examines are closely related to this proposal to build sewers around Crystal Lake. The issues are:

1. COST EFFECTIVENESS

Capital cost for the Facility Plan Proposed Action was estimated in the Plan to be $18.4 million. This is an investment of $2,207 per person or approximately $8,654 per existing dwelling within the Proposed Service Area. These per-person and per-household investments would be among the highest in EPA Region V.

Eighty-one percent of the estimated capital cost would be for new collector and interceptor sewers. Extensive use of pressure sewers as a potentially less expensive alternative to gravity sewers was considered by the Facility Plan consultants but at the insistence of the State of Michigan was not evaluated in the facility plan. Reliance on septic tank systems was briefly considered but was not incorporated into any of the Facility Plan alternatives. Use of other on-lot sewage disposal methods or small-scale technologies was not considered.

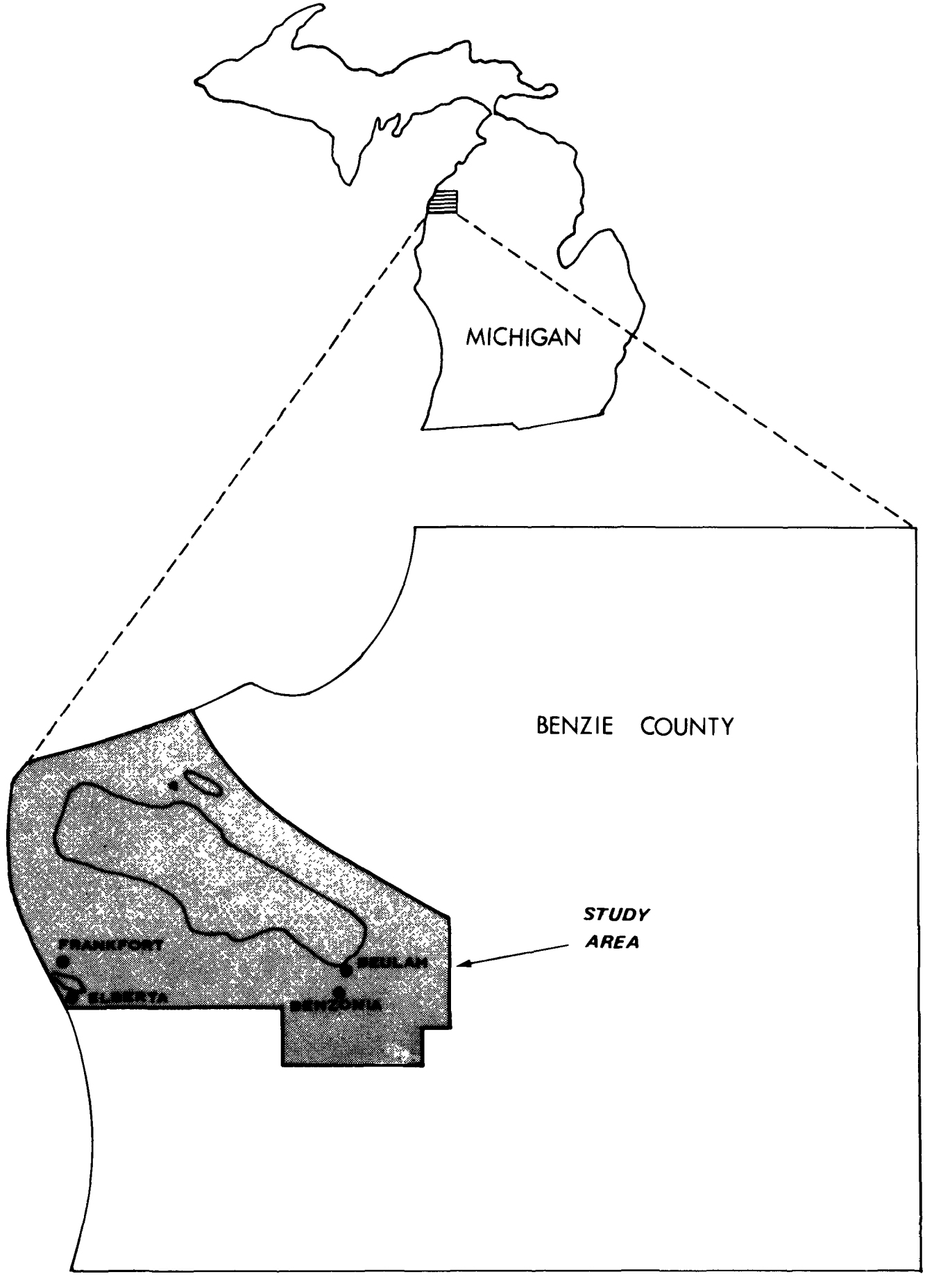

Figure I-1: Location of Crystal Lake Study Area

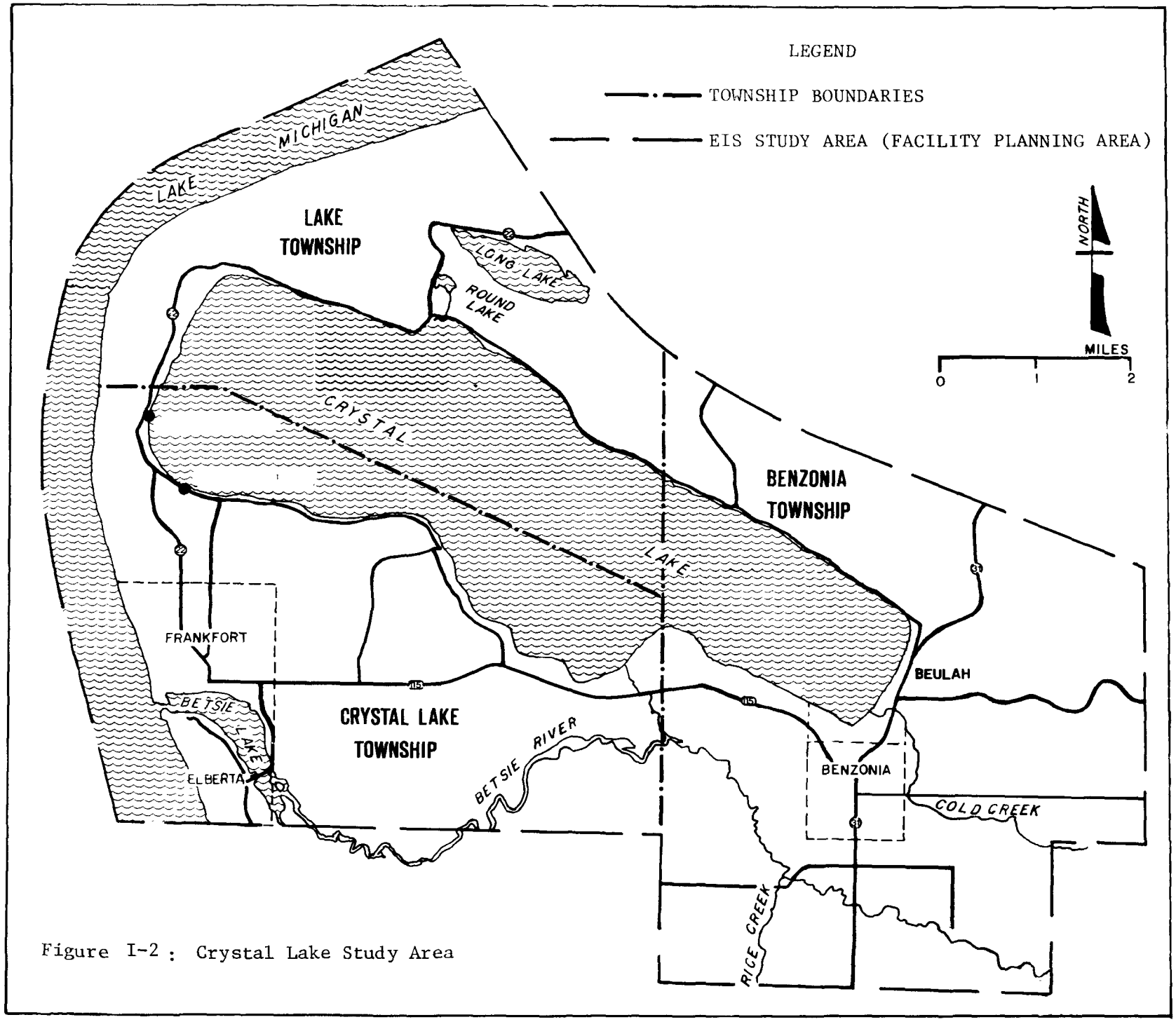

Figure I-2 : Crystal Lake Study Area

2. IMPACTS ON WATER QUALITY

Likely impacts of the Facility Plan Proposed Action and alternatives on water quality were not satisfactorily addressed particularly eutrophication of Crystal Lake and Betsie Lake and nearshore plant growth in Crystal Lake.

Citizen concern over growth of aquatic plants along scattered shoreline areas of Crystal Lake resulted in local funding of two limnological investigations of the lake: by Gannon in 1970 and Tanis in 1978. Both studies documented the presence near some shoreline points of aquatic plants growing on the lake bottom. The earlier report by Gannon predicted that substantial increases in plant growth would occur at existing nutrient loading rates. The report recommended that a sanitary sewer be built around the lake to collect sewage for treatment and export from the Crystal Lake watershed. The conclusions and recommendations of this report and statements of the local sanitarian (Livasy n.d.) were cited in the Facility Plan as the basis for not relying on septic tank systems around Crystal Lake in the future. The later report, by Tanis, showed that plant productivity had not increased as predicted and suggested that "an alternative which addresses specific problem areas may be more appropriate" than complete sewering of the shoreline. Neither the Facility Plan nor the limnological reports evaluated quantitatively the probable impacts on water quality of sewering or not sewering the shoreline of Crystal Lake.

The Facility Plan cited a 41% reduction in phosphorus load to Betsie Lake, resulting in removal of phosphorus from Frankfort and Elberta wastewater. However, the relationship between such a reduction and lake eutrophication was not described . The increased nutrient loads due to new and larger discharges of effluent following population growth were not calculated.

3. ECONOMIC IMPACT

The estimated user charge for the Facility Plan Proposed Action was $175 per year for each residence or residential equivalent in the new sewer service area around Crystal Lake. This charge would amount to 1.9% of the permanent residents' average annual income. Crystal Lake homeowners would also pay an initial $1,500 for stub fee and connection charge in addition to the cost of installing a house sewer to connect the household plumbing with the public sewer.

The effect of these costs could be to encourage seasonal and fixed income residents to sell their properties or to convert from seasonal use to permanent residency.

4. INDUCED GROWTH AND SECONDARY IMPACTS

While the high costs of wastewater collection might force some current residents to move, the availability of sewers in the Crystal Lake watershed would make possible construction of new dwellings in greater number and in higher densities than is presently feasible. The potential for significant future development is indicated by the substantial number of undeveloped platted shoreline, second tier and subdivision lots in the area.

The rate and type of development supported by a central sewer system could have undesirable impacts. In particular, housing construction on steep slopes could accelerate soil erosion which, in turn, would increase nutrient impacts to Crystal Lake or Betsie Lake. In addition, the density and type of future development feasible with a central sewer system could be considerably different from what is presently typical of the Crystal Lake area.

B. THE NEED FOR IMPROVED WASTEWATER MANAGEMENT - BETSIE LAKE

The need for upgrading or replacing sewers and two primary treatment plants serving the Village of Elberta and the City of Frankfort was not an issue in the EIS. The existing treatment plants discharge to Betsie Lake which flows through Betsie Harbor into Lake Michigan. Utilizing eutrophication modeling, the Draft EIS shows 48% of the phosphorus loading to Betsie Lake resulting from these treatment plants. Removal or reduction of this phosphorus source will improve the lake's trophic status.

C. THE NEED FOR IMPROVED WASTEWATER MANAGEMENT - CRYSTAL LAKE

The primary source of data on water quality in the Crystal Lake Facility Plan was a report titled "Crystal Lake Water Quality Investigations," by Dr. John J. Gannon of the University of Michigan (1970). The Gannon report concluded that:

- the most important source of pollution in Crystal Lake was the inflow from Cold Creek. Several business establishments and houses along its north branch contribute phosphates to Cold Creek.

- the highest coliform levels and algal concentrations existed in the waters adjacent to the north shore toward the east end of the lake.

- wells along the northeast shore showed significantly higher concentrations of nitrate than did wells in other areas. Nitrate levels in this area generally ranged from 1 to 6 mg/l as N. (EIS Note: of the 99 wells sampled on the northeast shore, 45 had nitrate concentrations less than 1 mg/l as N, 50 had concentrations between 1 and 6 mg/l, and 5 had concentrations greater than 6 mg/l.)

- Crystal Lake is oligotrophic; dissolved oxygen concentrations in the deep areas are 7.2 mg/l or greater.

- the algal mass in Crystal Lake will increase three times in a period of 7 to 10 years.

- sanitary sewage should be collected by means of a sewer system that would encircle the lake; this sewage should then be treated and discharged outside the basin.

A letter was included in the Facility Plan from Mr. Lyle Livasy, R.S., staff sanitarian with the Grand Traverse-Leelanau-Benzie District Health Department (GT-L-BHD), citing severe soil limitations for on-site systems and high coliform bacteria counts at two houses on the northeast shore as need for improved wastewater management.

A series of studies has been conducted during EIS preparation to evaluate in greater detail the water quality and public health problems related to use of on-site systems around Crystal Lake. In chronological order, the studied reported in the Draft EIS and their major conclusions are:

- Eutrophication Modeling - On-site sewage disposal systems contribute an estimated 6.7 % of the phosphorus load to Crystal Lake. Removal of this source would result in negligible improvement in the lake's already highly oligotrophic status.

- Aerial Photographic Survey - of the 29 identified problem on-site systems, 10 were found to be actively failing, 12 showed signs of having failed in the past and 7 were suspected of failure but not confirmed by field checks. Of these 29 systems, sewers proposed in the Facilities Plan could have eliminated 9 in the Village of Benzonia, and 5 around Crystal Lake. Failures detected by this survey include only those cases where septic tank effluent flows to the surface of the ground. Figure I-3 shows the locations of the 29 malfunctions. Appendix A describes the survey methodology.

- Sanitary Survey - Interviews with homeowners and inspections of lots and shorelines produced a substantial amount of information on the condition of on-site systems around Crystal Lake. Over 50% of the systems inspected violated the current sanitary code. However, only 3% have had problems with ponding more than once. Six percent have had backups in the house that could not be attributed to occasional hydraulic overload or a correctable maintenance problem. Thirty-four percent of the homes had the green algae, Cladophora, growing along their shoreline; 10% had "heavy" growths.

- Investigation of Septic Discharges - Neither aerial surveys nor sanitary surveys can detect poorly treated septic tank effluent that may be entering lakes by way of groundwater. Using a septic leachate detector, 90 effluent discharges were found entering Crystal Lake. Sampling and analysis of ground and surface waters in the area of the plumes showed that they were not seriously effecting lake water quality. The only significant effect was the stimulation of plant growth on rocks or logs where the plumes emerge. The highest frequency of plume emergence was along the northeast and southeast shorelines. Figure I-4. shows the locations of plumes.

After publication of the Draft EIS in June 1979, three additional studies were conducted. These were:

1. GROUNDWATER HYDROLOGY

The results of the Investigation of Septic Discharges suggested a significant movement of groundwater into and out of Crystal Lake at various locations. In the general description of groundwater flow proposed in the Draft EIS, Crystal Lake intercepts the area's groundwater table. The groundwater table is not flat but falls from east to west toward Lake Michigan. The eastern end of Crystal Lake lies below the groundwater table and so acts like a withdrawal well. Springs at the foot of hills along the north and southeast shores and the high density of plumes support this. At the western end of the lake, few effluent plumes are found suggesting that the lake surface is above the groundwater table, and that outflow of Crystal Lake water is toward Lake Michigan.

Confirmation of the groundwater flow, suggested by the effluent plume data, was sought by another method.

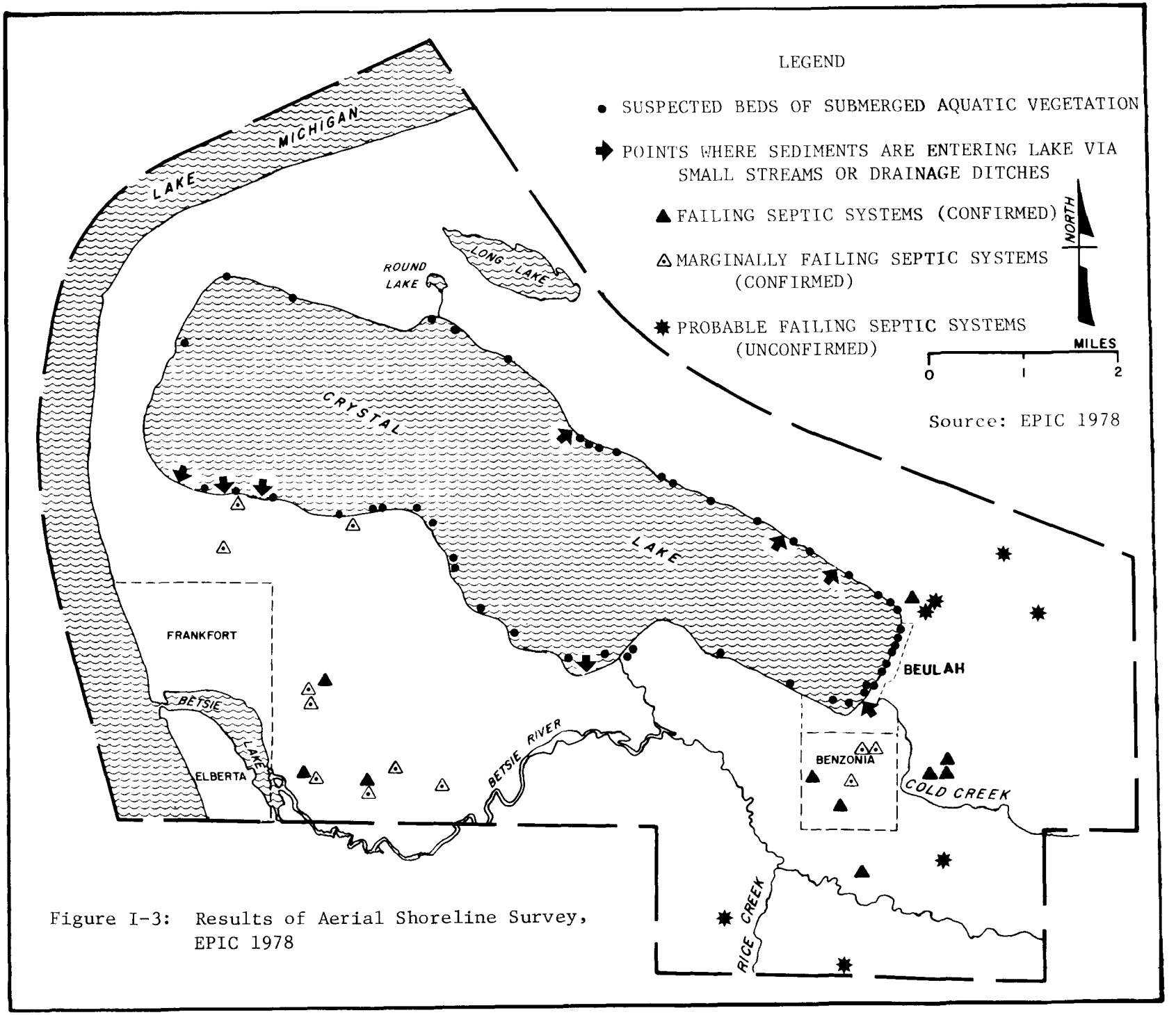

Figure I-3: Results of Aerial Shoreline Survey, EPIC 1978

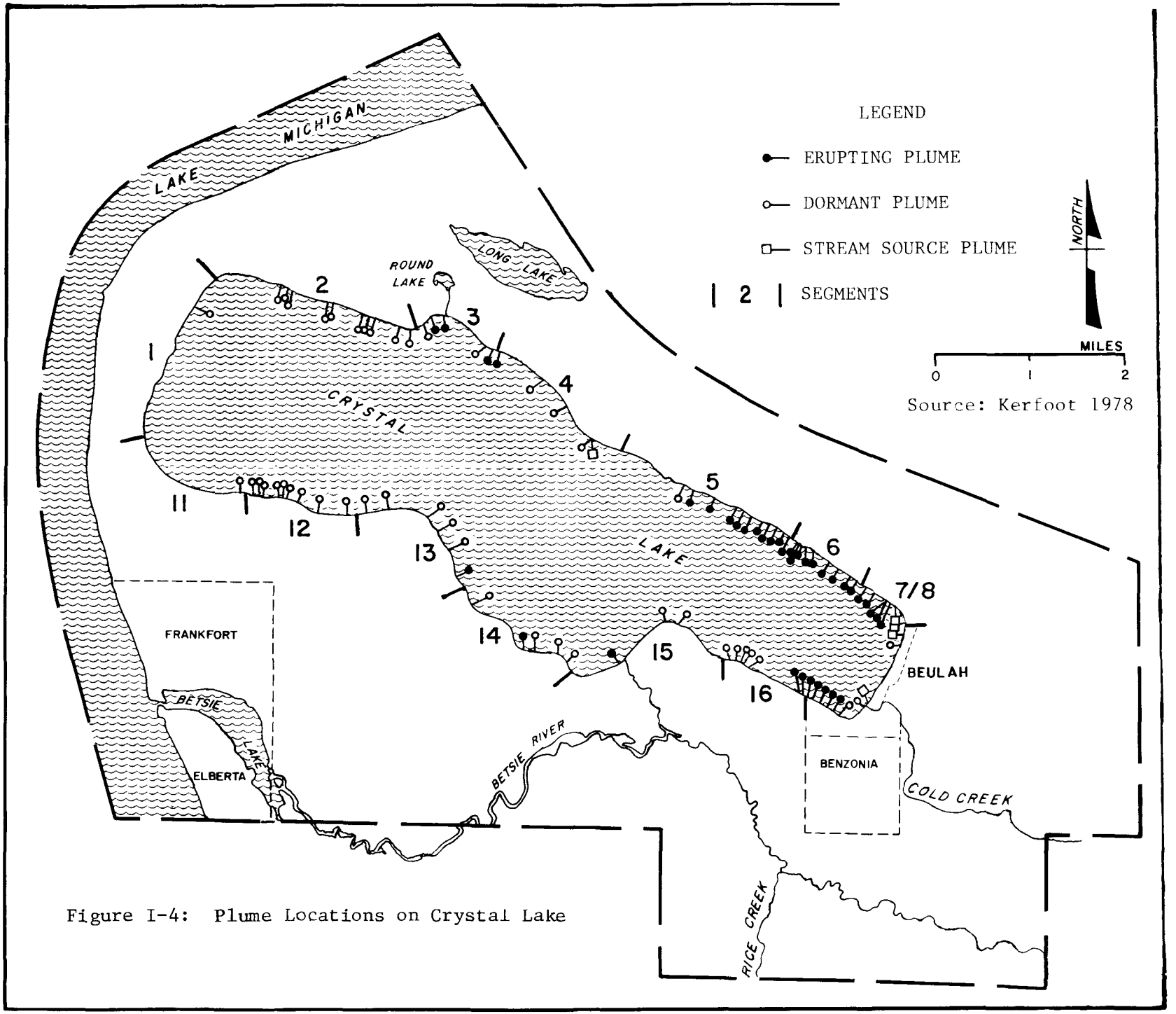

Figure I-4: Plume Locations on Crystal Lake

At intervals of about one-half mile along the lake's shoreline, groundwater flows were measured using a meter which 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 listed in Table I-1 and illustrated in Figure I-5.

With few exceptions the direction of flow at locations at the east, north, and west shores was toward the southwest and west. In contrast, flows along the south shore showed considerable variation. Because measurements were made at the water table and in a transition zone between groundwater and the lake, the data reflect local variations in soil porosity, surface drainage, size of local recharge areas, manmade diversions and additions (such as septic tank effluents). On the east, north, and west shores such local variations appear to be dominated by the regional groundwater flow, which Crystal Lake intercepts. Flow on the south shore is more subject to the influence of local factors.

Flow rates below 3 feet per day were found only along the east shore and at scattered points on the southwest shore. Elsewhere, most flow rates were between 3 and 12 feet per day. Readings above 12 feet per day were few but, notably, were found on the northeast and southeast shores.

This new data explains some of the findings of the Investigation of Septic Discharges (See Figure I-4), particularly the absence of plumes on the west shore and the scattered presence of plumes on the south shore. Despite the time lapse between the two studies, it remains obvious that direction of groundwater flow determines the emergence of effluent plumes into lakes. It is also highly likely that rate of flow, along with other factors such as distance from disposal point to the shore and soil characteristics, influences the strength of plumes and their effects on lakes.

2. ANALYSIS OF NEAR SHORE AQUATIC PRODUCTIVITY PROBLEMS

Prior studies on Crystal Lake and elsewhere had suggested a correlation between the growths of an algae, Cladophora, and effluent emergence at the lakeshore. However, these studies did not establish a cause and effect relationship between effluent emergence and growth of Cladophora. For the latter purpose, and to evaluate factors controlling effluent plume movement, five on-site systems close to Crystal Lake were selected for detailed monitoring. The sites selected represent worst-case examples of proximity to shore, depth to the water table and age of dwelling. Monitoring of each site included:

- Location of plume emergence points by three methods including (1) shallow (18 inches) groundwater sampling along the beach and analysis by septic leachate detector (2) septic leachate detector scans of the surface waters at 1, 2, and where possible, 3-foot depths, and (3) measurement of groundwater flow

- Collection and analysis of groundwater samples at 1, 3, and 5 foot depths below the water table or below lake bottom at 3 to 6 points along a transect. Transects were determined in the field to be the

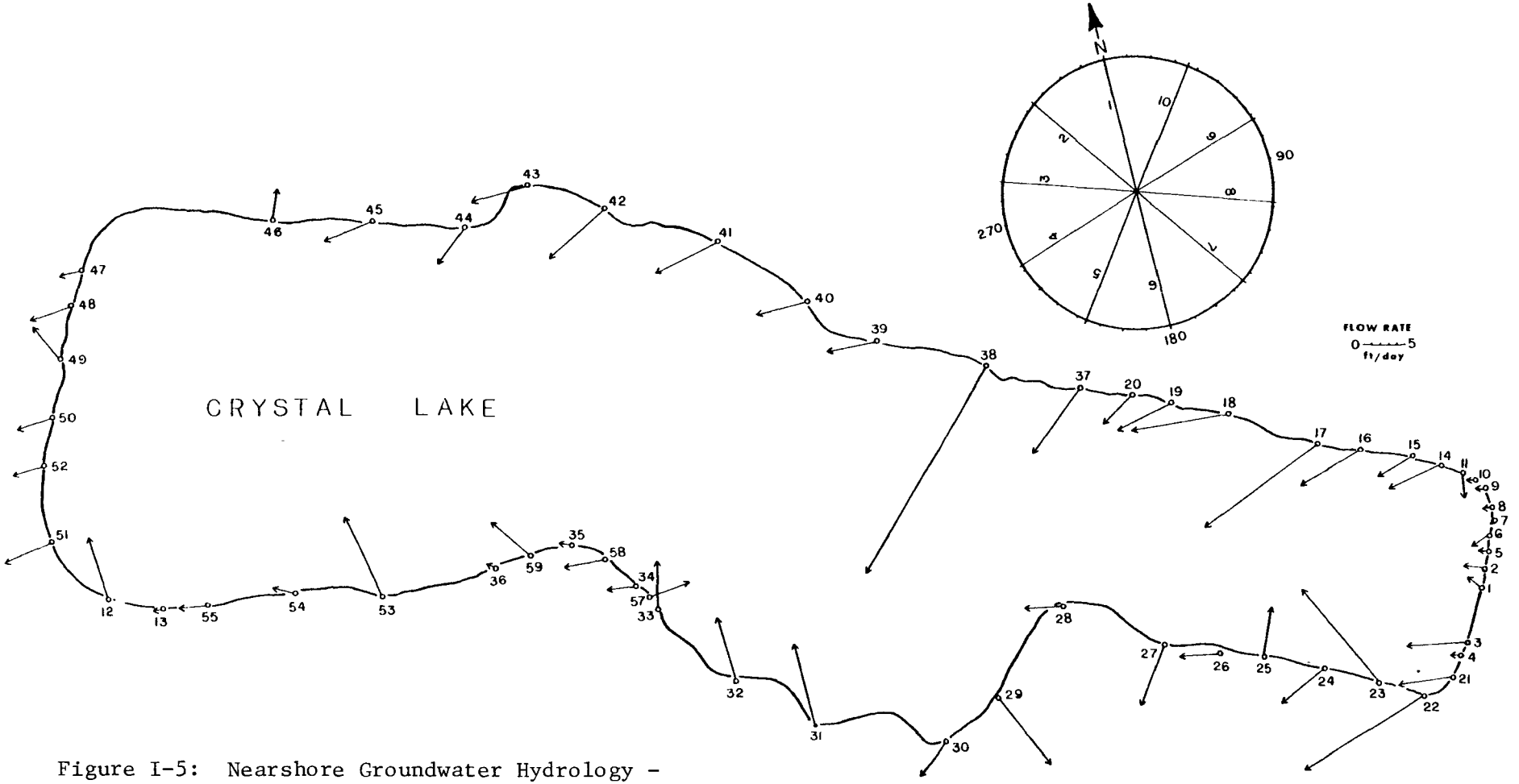

Figure I-5: Nearshore Groundwater Hydrology - Crystal Lake

Table I-1

Nearshore groundwater hydrology - direction and rate of flow of groundwater as measured by the Model 10 "Dowser" groundwater flow meter calibrated against Beulah Beach medium sand.

Station #	Flow Direction	Flow Rate (ft/day)
1	324° NW	1.8 ± 1.0
2	290° NW	2.1 ± 1.1
3	282° NW	7.1 ± 2.1
4	285° NW	.9 ± .4
5	288° NW	.9 ± .0
6	252° W	2.0 ± .8
7	245° SW	.3 ± .6
8	280° NW	.9 ± .9
9	288° NW	.9 ± .0
10	288° NW	.9 ± .0
11	187° S	2.7 ± .0
12	359° N	7.8 ± 1.9
13	280° W	.9 ± .0
14	260° W	6.6 ± 1.4
15	253° SW	4.6 ± 1.3
16	253° SW	8.2 ± 1.3
17	248° SW	16.8 ± 7.1
18	274° W	11.4 ± 5.8
19	258° W	6.8 ± .6
20	240° SW	6.4 ± 2.5
21	276° W	6.4 ± 2.4
22	254° SW	16.4 ± 10.9
23	335° NW	14.1 ± 4.5
24	246° WSW	6.4 ± 1.3
25	23° NNE	5.5 ± .0
26	277° W	4.6 ± 1.3
27	218° SW	7.3 ± 1.3
28	280° W	
29	156° SSE	9.6 ± 5.8
30	230° SW	5.0 ± 1.9
31	360° N	10.5 ± .6
32	324° NW	7.7 ± .6
33	17° NNE	5.5 ± 2.6
34	274° W	3.2 ± .6
34	290° WNW	1.4 ± .6
36	308° NW	.9 ± .0
37	232° WSW	9.6 ± .6
38	226° SW	28.7 ± 3.2
39	276° W	5.9 ± .6
40	270° W	5.9 ± 3.2
41	260° W	7.7 ± 1.9
42	242° SW	8.6 ± .6
43	264° W	6.8 ± .6
44	234° SW	5.0 ± 3.2

45	264° W	5.9 ± 1.9
46	25° NE	3.6 ± 1.9
47	274° W	2.7 ± 1.5
48	268° W	4.8 ± 1.1
49	337° NNW	5.0 ± 1.9
50	268° W	4.1 ± .6
51	263° W	5.9 ± .6
52	269° W	3.6 ± 1.6
53	351° N	10.5 ± .6
54	303° NW	2.5 ± 2.3
55	281° W	5.2 ± .2
56	297° NW	5.9 ± 3.2
57	84° E	4.6 ± .0
58	275° W	4.8 ± .6
59	325° NW	5.9 ± 3.2
60	119° SE	7.3 ± 3.2

center line of the effluent plume. Parameters analyzed were dissolved oxygen, hydrogen ion concentration (pH), relative fluorescence, total dissolved solids, orthophosphate, total phosphorus, nitrate nitrogen, nitrite nitrogen, ammonia nitrogen, organic nitrogen, chlorides, sodium, and iron. Field data for one residence was misinterpreted, resulting in a transect that missed the effluent plume except at one point next to the drainfield.

- Collection and analysis of soil and sediment samples at selected points along the plume transect. Parameters analyzed included percent moisture, total volatile solids, cation exchange capacity, water-extractable phosphorus, weak acid extractable phosphorus, phosphorus sorption, water extractable nitrates, total kjeldahl nitrogen and particle size distribution.

- Description of aquatic plant growths and nutrient analysis of selected plants.

- Interviews with the residents to determine design, location, and usage of their sewage disposal systems.

- Three wells and two septic tanks were sampled and analyzed for the same parameters as the groundwater samples.

The main conclusion drawn from these studies is that effluent plumes are a source of nutrients stimulating near-shore plant growth. The growths are highly localized to the point of effluent emergence but, within these limited areas, are very dense. The spatial extent of the growths varied from site to site and appears to be limited by non-nutrient factors, especially the availability of stable substrate such as rock and log jetties. Despite very great site differences in amount of sewage generated and nutrient concentration in groundwaters near the shoreline, Cladophora growth was found at all sites and the density of growth on stable substrates was extraordinarily high at 120 to 270 grams dry weight per square meter of substrate. It is not clear from the data which constituents of the effluent plumes are responsible for this growth. While phosphorus is suspected, one of the sites had very low phosphorus concentrations in its groundwater yet had Cladophora density as high as any site. Nitrogen compounds, vitamin B-12, and sulfates are other nutrients which Cladophora requires for growth.

In addition to the Cladophora algae mats firmly attached to cobbles on the lake bottom were found on all five lots. These mats are inconspicuous since they are generally less than one-eighth inch thick and are brown or grey because of trapped, fine sediment particles. Correlation of these algal mats with effluent plume emergence was not attempted. It is possible that the mats include considerably more biomass than the Cladophora beards since the larger, conspicuous algae are limited to stable substrates washed by effluents while the mats may be more widespread. The algae mats were primarily composed of many species of diatoms with minor representation of blue-green algae by the filamentous Oscillatoria, a common bottom-dwelling alga. Species composition of these mats was surprisingly similar among the five sites.

At two of the oldest sites (21 and 35 years) a third vegetation type was found, the rooted vascular plant, Potamogeton. In comparison to Cladophora,

which was growing in a narrow band within the splash zone on rocks and logs, Potamogeton plants were rooted between cobbles which pave the shallow lake bottoms in places. The distribution of these plants coincided with the general areas of plume emergence on these two lots.

The attenuation of phosphorus by the saturated soils under these lots did not follow expected patterns. Phosphorus attenuation within the plumes could not be monitored at two of the five sites: one site had little or no phosphorus throughout the transect and the transect was missed on second site. At the other three sites, phosphorus attenuation between the soil disposal systems and shorelines was slight or could be explained by dilution. For the two permanently occupied sites, average total phosphorus concentration in groundwater near the lake shore was 3 mg/L.-P., more than enough to satisfy the phosphorus requirements of the near-shore plants.

These two sites are representative of worst-case conditons: they are premanent residences, had received higher than normal use in the weeks preceeding sample collection, were close (40 and 90 feet) to the lake, and used dry wells for effluent disposal. The 3 mg/l-P represents approximately a 25% breakthrough rate. Using this information, data from the sanitary survey on Cladophora density, and some crude modeling, a weighted breakthrough rate of 8% for all houses near the lake was calculated. This is very close to the assumption used in the Draft EIS to model the septic tank phosphorus contribution to the lake.

3. COLD CREEK SURVEY

In July 1979 Cold Creek and one of its tributaries were monitored with a septic leachate detector to seek sources of fluorescent materials. In 1978, Cold Creek was identified as a significant source of both fluorescent materials and conductivity. Controversy over the source of these materials led to the 1979 survey.

The 1979 survey found very slightly elevated fluorescent and conductance readings in Cold Creek proper between its mouth and its confluence with a small tributary which flows south parallel to US Route 31 joining Cold Creek just above a man-made settling lagoon. Above this confluence the readings for Cold Creek were at background levels. The south-flowing tributary, however, had substantially elevated readings but not as high as the 1978 readings at the mouth of Cold Creek.

The data on Cold Creek remains difficult to interpret. The 1979 survey suggests that the source of fluorescence and conductivity detected in 1978 is neither the Beulah sewers which cross Cold Creek nor the watershed as a whole. The source appears to be located in the small subwatershed northeast of Beulah but is yet unidentified. Possibilities include both wastewater discharges (from active or abandoned on-site systems or illegal discharges) and natural sources of fluorescent chemicals (decaying vegetation in the marshes adjoining the tributary or decaying wood wastes at an abandoned lumber mill reported to be in this area). It should be noted that the septic leachate detector does not locate any non-point source of nutrients other than wastewater discharges and decaying vegetation. Eroded soils and agricultural fertilizers can be sources of high non-point nutrient loads that would not be detected except by conventional sampling and analysis.

Chapter II

ALTERNATIVES

A. THE FACILITY PLAN PROPOSED ACTION

The Facility Plan recommended construction of a sewer system to serve all of the developed areas around Crystal Lake, the Village of Benzonia, US Route 31 south of the Village and Homestead Road east of Benzonia. Thirty-five miles of 8-inch to 18-inch gravity sewer, 15 miles of 1½-inch to 14-inch force main, and 35 lift stations would be required to served this ares. See Figure II-1.

A new .89 mgd rotating biological contactor (RBC) wastewater treatment plant would be constructed at a publicly owned site in the City of Frankfort. Chemical additions to the RBC effluent and micro-screening of the secondary clarifier effluent would reduce the phosphorus in the plant effluent to 1 mg/l or less. Chlorination of the final effluent prior to discharge to Betsie Lake would be provided.

The existing primary treatment plants at Frankfort and Elberta would be abandoned. New interceptor sewers would be installed to connect sewers at each site to the new RBC plant.

Sanitary sewer evaluation surveys and sewer rehabilitation were proposed for the existing sewer systems in Frankfort, Elberta, and Beulah. Rehabilitation of Frankfort's system would include construction of new storm sewers and modifications to the existing combined sewers in order to eliminate direct discharge of sanitary wastes to Betsie Lake due to overflows.

The Village of Beulah decided not to participate in the regional system and will continue to operate its lagoon and infiltration basin treatment system. The Facility Plan recommended that, in addition to sewer evaluation and rehabilitation, groundwater monitoring wells be installed at the treatment plant and that a standby electric power generator be provided for existing lift stations. By the Village's choice, these measures would be funded by the Village without assistance from state or Federal grants.

Cost developed in the Draft EIS for the Facility Plan Proposed Action are:

1980 Construction Costs - (including engineering, legal, and contingency costs)	$17,303,000
Future Construction Costs -	$2,467,000
Annual Operation and Maintenance Expense -	$181,400/yr
1980 Local Cost -	$1,010,000/yr
1980 Average Annual User Charge -	$110/yr Frankfort and Elberta $720/yr New service areas

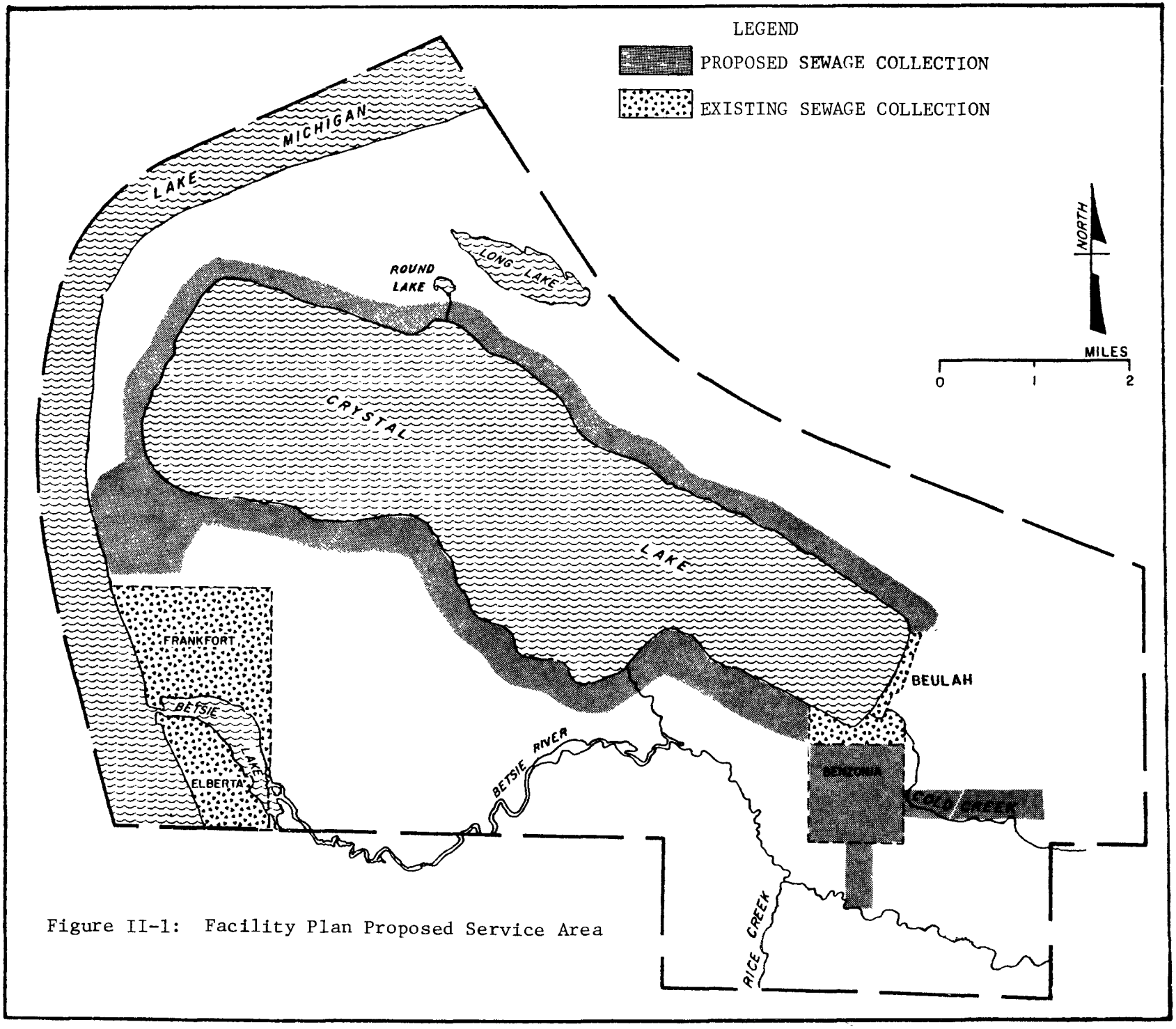

Figure II-1: Facility Plan Proposed Service Area

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 of an interest rate of 6-7/8% with a payback period of 30 years. This charge for the new service areas is strongly influenced by the eligibility of the 50 miles of new sewers. EPA made a preliminary eligibility determination that makes 40% of the cost for these sewers eligible.

Implementation of the Facility Plan Proposed Action would include conventional procedures that are adequately described in the Facility Plan.

B. THE EIS RECOMMENDATION - LIMITED ACTION

For the existing sewer service areas in Frankfort, Elberta and Beulah, the EIS Recommended Action is the same in concept as the Facility Plan Proposed Action except that the new RBC plant in Frankfort would only need to handle .32 mgd. Another possible exception is that site specific analysis, lack of off-site treatment locations and cost-effectiveness analysis may show that treatment at Beulah's plant of residential wastewaters collected from the northeast and southeast shores of Crystal Lake would be economically and environmentally attractive.

For the unsewered parts of the Proposed Service Area (see Figure II-2), this Limited Action would continue the use of existing on-site systems wherever feasible. In addition, the community's role in managing on-site systems would be expanded to include, at least, supervison of system maintenance, monitoring of present or potential underground potable water sources, and collection of user charges to recover the costs involved.

Many elements of this approach, including likely maximum costs can be sketched now, but the final details will not be known until: 1) house-by-house analysis allows a selection of treatment methods for each house and 2) the applicant and community decide on the method and degree of management to be provided. The two considerations are discussed below.

1. TECHNOLOGY SELECTION

Identification of on-site systems' problems and the causes of their problems is the first step to be taken specifying technologies for individual residences. Site specific analysis is necessary to accomplish this. The analysis should be sequential, beginning with accessing 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 to identify the cause and possible remedies for recognized problems. Examples of additional investigations keyed to problems are:

Problem	Investigations in Sequential Order
Recurrent Backup in House or Surface Malfunction	Install and monitor water meter

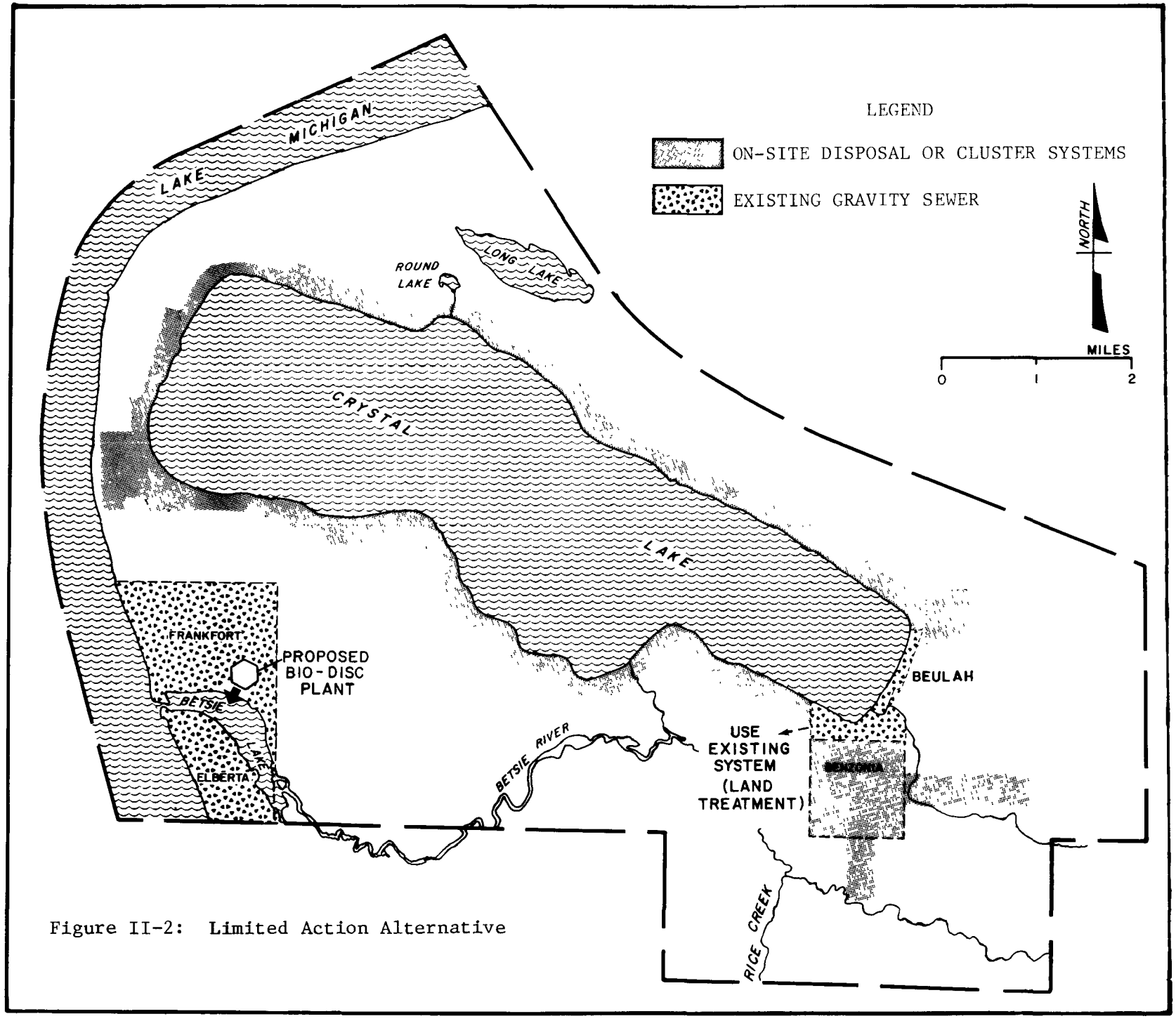

Figure II-2: Limited Action Alternative

	Uncover pump and inspect septic tank for obstruction and groundwater inflow
	Rod house sewer and effluent line
	Excavate and inspect drainfield distribution lines, if 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 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 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 upgrade
	If feasible, document system inadequacies by probing and sample pit excavation.
Septic Tank or Soil Absortion System Size or Design Known to be Less than Code Requires	Inspect property to assess feasibility of replacement or upgrade

In the selection of technologies of individual sites, it is strongly recommended 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 selections

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

- that 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

- that the individual homeowner should be informed of the different options being considered (and their costs) when technology selections are being made. His opinion and advice should be solicited.

Utilizing information gained from the site analysis, feasibile approaches to solving any problems should be discussed with the owner. Primary criteria for identifying the appropriate technology should be cost, benefits, and risk of future failure. Undoubtedly, eligibility for Construction Grants funding will be considered also. General guidelines for eligibility of on-site technologies are presented below:

- Replacement of facilities of obviously inadequate design will be eligible if feasible. Cess pools are an example of obviously inadequate facilities. Septic tanks which are in very poor repair or are substantially smaller than required by state codes are another example. Small drainfields, dry wells or unusually designed systems are not of obviously inadequate design.

- Parts of systems which cause recurrent surface failures, backups or contamination of potential drinking water aquifers are eligible for repair or replacement. This does not apply to water using fixtures. Systems which 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.

- Facilities which are 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 which are shown to be contributing to failures.

- Compliance with state and local on-site design regulations in design of repairs and replacements is desired where feasible and effective. Compliance is not a condition of eligibility if sub-code design, or alternative processes can reasonably be expected to eliminate or substantiate mitigate public health and water resources problems. Innovative designs will similarly be eligible with the added condition that inspection and monitoring commensurate with the degree of risk be assured. For sub-code, 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 this Study Area, methods will be eligible which modify the flow or chemical characterisitcs of effluent plumes that enter Crystal

Lake if the modification might reduce the nearshore plant growth. Such methods will be considered 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 uses 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:

1) a public health or water resource contamination problem is documented that cannot be abated by any combination of on-site conventional, innovative, sub-code, flow reduction or waste restriction methods, or

2) 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 - the community compounded the risk of on-site system failures by permitting these systems in their present form and leaving their maintanance to the responsibility of their owners. EPA is recommending and funding the Limited Action alternative to help the community and system owners minimize the risk, thereby protecting water quality and the public health. For systems to be built for new housing, EPA makes no recommendations on the permitting process since the Agency does not presently expect to be funding remedies for their failures.

2. COMMUNITY MANAGEMENT

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

> ...the grant applicant 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-site systems.

Within this limitation, communities have a wide range of options available. Many of these options were discussed in the Draft EIS, Section III.D.2. To add depth to the subject, 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 which is dependent on 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 Crystal Lake only so far as permitting and inspection activities minimized risk. The consequences of facility failure rest with the systems' owners. In building a sewer around Crystal Lake, Benzie County essentially would have accepted liability for all failure except for 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 being that the Benzie County Department of Public Works 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 DPW'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 Crystal Lake. EPA encourages this but does not require it. The scope of the DPW's responsibilities depend on how much liability for wastewater facilities it wants, and is legally capable, to assume. EPA will, by funding facility planning, design and construction, assist the DPW in meeting those liabilities it assumes which 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 Benzie County Department of Public Works would act as the recipient and distributor of Construction Grant funds. Homeowners who wished to improve their on-site facilities could apply to the DPW for this assistance. After documenting that minimum requirements for on-site system eligibility are met, the DPW 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, neither the County nor the municipalities would incur any long-term debt. The DPW would not necessarily have any responsibility for or interest in permitting future on-site systems. Lacking a comprehensive site inspection and evaluation program, it is unlikely that all water quality and public health problems would be identified on abated. 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 flow district concept discussed in the Draft EIS. See particularly pages 141-144 and 185-186 and Appendix K. 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 homeowner's, 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 insure 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 authroity greater discretion in sharing liability for facility operation with the resident or building owner.

Watershed Management

The applicant's concern with prevention and control of water pollution need not be restricted to wastewater facilities. It is obvious from the local funding of prior water quality studies by Dr. John Gannon in 1970 and Fred Tanis in 1978 and from comments on the Draft EIS that citizens of the Study Area are greatly interested in maintaining the water quality of Crystal Lake. If that interest is expressed in the form of willingness to pay for additional governmental services, the Comprehensive Wastewater Management scenario could be augmented by the following functions:

- non-point source monitoring
- non-point source control
- education of residents and visitors about individual pollution control practices, costs and benefits
- inventory the biological resources of the lake and its tributaries
- research the chemical, hydrological and biological dynamics of the lake
- coordinate with other local, state, and Federal agencies on pollution control activities and funding.

3. COST ESTIMATE

In response to comments on the Draft EIS, the cost estimate of the Limited Action Alternative has been reviewed in detail. Two cost elements have been revised upward: the engineering, legal and contingency fee, and operation and maintenance costs. These revisions are discussed in more detail in the Comments and Responses under the "Alternatives" heading.

The revised price parameters for the Limited Action Alternative are:

	Frankfort and Elberta	Unsewered Service Area
1980 Construction Cost - (including engineering, legal, and contingency costs)	$3,897,100	$1,936,800
Future Construction Costs	553,400	93,800/yr.
Annual Operation and Maintenance Expense	53,500	113,500
1980 Local Cost	120,733	131,996
1980 Average Annual User Charge	100	95

4. IMPLEMENTATION

As recommended in the Draft EIS, the Limited Action Alternative has been divided into two projects, one for the centralized facilities in Frankfort and Elberta, the other for municipalities around Crystal Lake. Michigan Department of Natural Resources has given separate priority ratings to the two projects, both of which are in the fundable range.

Since publication of the Draft EIS, Michigan DNR has revised the effluent limitations for the new Frankfort treatment plant to allow higher BOD and suspended solids concentrations. The new limitations are:

Parameter	30-day Average	7-day Average
5-day BOD	30 mg/l	45 mg/l
Total Suspended Solids	30 mg/l	45 mg/l
Fecal Coliform Bacteria	200/100 ml	
pH	6-9	
Total Phosphorus	1.0 mg/l	

Specific aspects of implementing the Crystal Lake project were discussed in Section V.B.2 of the Draft EIS. Modifications to those discussions are:

- Ownership of On-Site Systems Serving Seasonal Residents - The statement was made that privately owned systems serving seasonally occupied 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" heading.

- Completion of Step I Requirements for the Small Waste Flow District - Michigan DNR has requested that the site-specific environmental and engineering data base be developed as part of a Step I grant amendment instead of with a Step II grant as recommended in the Draft EIS. In response to this, and the very different proposals of other states, EPA Region V developed a new memorandum clarifying project needs documentation. It provides that at most a representative sampling (15 to 30 per out) of site-specific data base need be developed in Step I. The remaining 70 to 85% should be done in Step 2 (see Appendix E). Other remaining Step I requirements remain as stated on pages 186-187 of the Draft EIS.

For the purposes of technology selection and organization development in Step 2 and construction supervision in Step 3, the grantee will establish a Sanitary Review Board. The boards's responsibilities will be to:

- supervise the direction and progress of the site specific analysis
- insure 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 which are not in conformance with present regulations
- provide an appeal process for owners who object to the technology selected for their property and
- insure that site analysis and technology selection is conducted by a multidisciplinary team consisting 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.

Description of the grantee's organization of this review board and the qualifications of individuals proposed for the Step 2 site analysis and technology selection should be included in the application for Step 2 funds. 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.

It is recommended that the necessary technical expertise be sought from several sources such as:

- the Grand Traverse-Leelanan-Benzie District Health Department
- Benzie County Department of Public Works - existing staff or new hires
- corporate consultants
- individual consultants

- universities
- Northwest Michigan Regional Planning and Development Commission

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 and, within reason, they will be grant eligible.

For the purpose of long-term continuity, it is recommended that at least one person be hired by the DPW to have an active role in Steps 2 and 3 work, to act as the review board's staff, and to provide technical expertise in the future.

C. THE NO ACTION ALTERNATIVE

The No Action alternative is broadly defined as an EPA rejection of Construction Grants applications for the Study Area. More specifically, the implication of this is that the sewers and treatment plants in Frankfort and Elberta would not be upgraded. In the unsewered parts of the Study Area, the Health Department would continue to issue permits for new septic tank systems on suitable lots and to require correction of surface malfunctions.

With the No Action Alternative, the Village of Elberta and the City of Frankfort would violate State and Federal effluent discharge requirements when interim limitations expire. Betsie Lake would maintain its eutrophic status. Additional flows to these primary treatment plants would be prohibited because they are already overloaded.

The need for improved wastewater management around Crystal Lake is less clear. The number of on-site systems experiencing serious or recurrent malfunctions is small--less than 10%. The impacts of individual on-site systems on Crystal Lake water quality are variable but, taken together, the systems have not been shown to adversely affect the lake. The most noticeable impact of the systems is stimulation of localized plant growths on and near beaches of approximately one-third of the lake frontage properties.

With the No Action Alternative, health authorities will continue to have inadequate information with which to design on-site system repairs appropriate to the problems and their causes. They are unlikely to have the time, personnel, or monitoring capabilities to be able to specify innovative attempts to solve the problems. The result will be increasing numbers of holding tanks on small lots and on lots with high groundwater.

No Action does not mean no cost. Assuming that existing systems will fail at a rate of two percent per year and be replaced by a mix of holding tanks, conventional drainfields or dry wells, or mound systems, the present worth of the No Action Alternative for only the Crystal Lake service area only could be $1,823,700. This compares to $4,006,200 for the Limited Action Alternative and $13,421,700 for the Facilities Plan Proposed Action (Crystal Lake portion only).

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:

FACILITIES PLAN ALTERNATIVES

Alternatives	Status
Optimum Operation - Beulah STP	Accepted by the Village of Beulah. No government grants requested.
Optimum Operation - Frankfort and Elberta STPs	Sites too small for required upgrading.
Land application east of Benzonia	Rejected in Facilities Plan on basis of cost-effectiveness.
Meter water use and base sewer charge on use to reduce wastewater flows	Hypothetical. Should be seriously considered if water mains are extended.
Rehabilitate sewer systems in Frankfort, Elberta, and Beulah	Incorporated in EIS Recommended Action for Frankfort and Elberta. Beulah not participating in grant application.
Separate combined sewers in Frankfort	Incorporated in EIS Recommended Action without further review.
Rotating biological disc (RBD)	Selected as treatment process in Facilities Plan along with chemical additions, microstraining, and chlorination. Incorporated in EIS Recommended Action without further review.
Activated sludge	Rejected in Facilities Plan because of RBD's lower energy requirement, lower operating cost, ease of operation, and reduced risk of upsets.
Physical-chemical treatment	Rejected in Facilities Plan on the basis of cost.
Treatment and reuse	No feasible alternatives due to types of local industries.
Sludge incineration	Not economically feasible. Does not conserve nutrients.
Digestion, dewatering, and land disposal of sludge	Incorporated in EIS Recommended Action for new Frankfort plant without additional review.

No Action	Rejected in Facilities Plan on basis of failure to address pollution problems.

EIS ALTERNATIVES NOT ALREADY CONSIDERED IN FACILITIES PLAN

Residential flow reduction by various devices	Expected to be effective in maintaining the operability and minimizing impacts of on-site systems in the EIS Recommended Action.
Laundry detergent phosphorus ban	Implemented by Michigan DNR prior to EIS process.
Pressure Sewers	Extensive use of pressure sewers rejected because of lack of need. Could be advantageous in the design of small waste flow systems.
Vacuum sewers	Rejected in preference to pressure sewers for comparison with gravity sewers. Could be advantageous in the design of small waste flow systems.
Small diameter sewers	Rejected due to marginal cost advantage over conventional gravity sewers for large collection systems. Could be advantageous in the design of small waste flow systems.
Alternative toilets - various designs	Not specifically incorporated in EIS Recommended Action but could be useful where control of nutrients is sought.
On-site treatment and disposal - various designs	Incorporated in EIS Recommended Action for Crystal Lake area - discharging systems excluded from use.
Off-site treatment and disposal - various designs	Incorporated in EIS Recommended Action for Crystal Lake area where shown to be worth the expense and trouble - discharging systems excluded from use.
Septage disposal by co-treatment at Frankfort RBC plant	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

Soils in the study area were formed from materials deposited by glaciers. They generally contain high proportions of sand and, with some exceptions, are permeable.

Much of the unsewered development in the Proposed Service Area is located around Crystal Lake on soils developed originally as submerged lake terrace. Lowering of the lake in 1873 exposed this sandy terrace. The terrace's elevation above lake level and groundwater varies from one location to another. A number of home-sites around Crystal Lake have less than three feet of soil above the groundwater table.

Because of the soil's permeability in most developed places, particularly the lake terrace, surface malfunctions and backups of existing on-site systems are expected to recur but at a low rate even with the No Action alternative. High permeability of lake terrace soils also suggests that septic tank effluents may not be adequately treated before emerging into the lake. Survey data and detailed site investigations suggest that treatment, particularly removal of nutrients, is variable. With the No Action Alternative, any systems which provide especially poor treatment would not be located and modified to provide adequate treatment.

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

B. SURFACE WATER RESOURCES

Crystal Lake occupies approximately 15 square miles; its tributary is Cold Creek. Betsie Lake occupies approximately 0.4 square miles. Its primary tributary is the Betsie River, and it is itself tributary to Lake Michigan.

Crystal Lake, despite a retention time greater than 60 years, is generally clean, clear and oligotrophic. At a distance from the shoreline, the Lake has shown little change in productivity in 10 years. Conversely, Betsie Lake, with a retention time of 2 days, is eutrophic. For both lakes, phosphorus has been identified as the limiting nutrient.

With the No Action Alternative, Betsie Lake is certain to remain eutrophic. Crystal Lake will remain oligotrophic. Near-shore plant growth around Crystal Lake may increase in frequency and severity. Judging from the worst examples studies during the 1979 Aquatic Productivity Study, this type of growth will not obstruct recreation or degrade water quality.

C. GROUNDWATER RESOURCES

Groundwater serves as the source of drinking water for Beulah, Elberta and Frankfort. Water supplies in the remainder of the Study Area consist of individual and small community wells. Water is generally plentiful and of good quality, although hard. A 1969 survey of 165 wells around Crystal Lake indicated no contamination by indicator bacteria; nitrates were generally present at concentrations ranging from 0-2 mg/l. The concentration of nitrate in 2 wells exceeded the Drinking Water Standard of 10 mg/l.

Sampling of groundwaters on lots adjacent to Crystal Lake indicated that concentrations of nitrogen compounds (including nitrate and compounds which could oxidize to nitrate, i.e., ammonia and organic nitrogen) exceeded 10 mg/l only in the core of effluent plumes. As long as ungrouted new wells are not located where effluent plumes will be allowed, the potable groundwater supplies should maintain adequate quality even with the No Action Alternative.

D. POPULATION AND LAND USE

Approximately 60 percent of the Proposed Service Area population are seasonal residents, located primarily in the unsewered areas surrounding Crystal Lake.

The total in-summer population of the Proposed Service Area in the year 2000 is projected to be approximately 12,500, a 47% increase over the 1975 figure. The average annual growth rate for the 28-year period from 1972 to 2000 is expected to be 1.5%, slightly higher than the historical rate of 1.4%. The largest absolute increase in combined permanent and seasonal population is projected for Crystal Lake Township--nearly 2,000 additional persons or 83% by 2000--while Benzonia Village, Beulah Village and the City of Frankfort are expected to increase by only 10 to 20% in that time.

Summary estimates of permanent and seasonal population and average annual growth rates for the years 1975 to 2000 for the Proposed Service Area are presented in Table III-1.

Table III-1

POPULATION PROJECTIONS AND AVERAGE ANNUAL
GROWTH RATES FOR CRYSTAL LAKE PROPOSED SEWER SERVICE AREA

Population Component	1975	2000	Average Annual Growth Rate (1975-2000)	Absolute Change (1975-2000)
• Seasonal	4,098	6,742	2.0%	2,644
• Year-round	4,420	5,748	1.1%	1,328
• Total	8,518	12,490	1.5%	3,972

With the No Action Alternative, growth in the Proposed Service Area would be limited to sites suitable for on-site systems. Because of this restriction, population may not grow at the rate projected. Based on number of platted lots and soil characteristics near presently developed areas, the year 2000 total population is estimated to be 7% below the projection above.

Land use in the Service Area consists of: three small urban centers (Frankfort, Elberta, and Benzonia); permanent and seasonal single family residences; agricultural areas devoted to row crops and orchards; and open land consisting of woodlands, wetlands, and sand dunes. The aesthetic appeal of the area has resulted in substantial residential development around Crystal Lake. Most commercial areas are located in the village centers and along major highways.

Significant increases in residential acreage would be likely within the proposed Crystal Lake Service Area regardless of the treatment alternative adopted. Residential acreage is projected to increase by 77% by the year 2000 even under the No Action Alterantive.

E. ENVIRONMENTALLY SENSITIVE AREAS

Environmentally sensitive areas within the EIS Study Area include wetlands, sand dunes, steep slopes, prime agricultural lands, flood hazard areas, habitat of three plant species classified as "threatened" by Federal and state agencies, an historic site in the Village of Benzonia, and four possible archaeological sites.

Of these, only steep slopes around Crystal Lake are likely to be adversely impacted by any of the alternatives, including No Action. Pressures to develop marginally suitable sites with on-site systems will increase as more favorably located sites are developed. Accelerated soil erosion that could result from construction activities and vegetation removal can be mitigated by adherence to the Sediment and Erosion Control Act of 1972.

The location and character of the four archaeological sites in Lake and Crystal Lake Townships have not been specified so that impacts on them by any of the alternatives are indeterminate. Prior to construction of any wastewater facilities on publicly owned land in these Townships, the Michigan State History Division will require an archaeological survey.

F. ECONOMICS

The permanent resident population of the Study Area Township is characterized by low incomes. Of this population, 17% are people living on fixed incomes that are below the average for all of Michigan's retirement age population. Income characteristics of the seasonal residents cannot be determined.

In regard to the No Action Alternative, were Frankfort and Eberta to construct, fund and operate the new facilities without State or Federal support, the average annual user charge per household would be approximately $280 per year compared to $100 if state and Federal funding is provided. This charge would cause a 40-50% significant burden and 10-15% displacement pressure (see Section IV.E.).

The costs of No Action in the Crystal Lake municipalities will fall most heavily on homeowners who must install holding tanks. A homeowner with four residents generating 45 gallons per person per day and paying $45 per 1,000 gallons pumped would be paying almost $3,000 per year for sewage disposal. Although this could be reduced substantially by installation of effective

flow reduction devices and negotiating with the hauler, the cost would still be substantial. The high cost would be an incentive for the homeowner to find other, perhaps dangerous, means of disposing of wastewater.

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 $2,000. If dosed mound systems were necessary, costs could be as high as $5,000.

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 Alternatives. Please note that the Limited Action Alternative is not at present 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 in the form of continuing attention to the use and effects of small-scale systems, and the ability to make balanced decisions, including exceptions, in the best interest of the local environment.

A. SURFACE WATER RESOURCES

For Betsie Lake the water quality impacts are nearly identical for the two alternatives. The difference in flow (year 2000 flows of 0.89 mgd vs. 0.33 mgd) will result in lower nutrient, organic and chloride loads on the lake with the Limited Action Alternative. However, the difference in total phosphorus load to the Lake is only one percent. Either alternative will produce a substantial reduction in the Lake's phosphorus loading--43 percent for the Facilities Plan Proposed Action and 44 percent for Limited Action. The result is expected to be a reduction in aquatic plant growth and improved water quality. Both alternatives would eliminate the occasional raw sewage discharges from Frankfort's combined sewers.

The Facilities Plan Proposed Action would nearly eliminate wastewater and septic tank effluent discharges to Crystal Lake. It is believed that much of the algae and plant growth on beaches associated with these discharges would go away over a period of one-to-three years. Beds of aquatic plants near the mouths of tributaries are expected to be unaffected by the Facilities Plan Proposed Action. The trophic status of Crystal Lake will not be measurably affected. With this alternative, there exists the possibility of pumping station breakdown and significant raw wastewater discharges to the Lake (up to .5 mgd). Careful design and close supervision of the pumping stations would minimize this possibility.

The Limited Action alternative would not totally eliminate algae and plant growth on beaches. Decreases in the occurrence and density of these growths would be achieved in places where off-site treatment (holding tanks or cluster systems and other small-scale measures) is selected. Improvement would also occur where repair of on-site facilities (elimination of dry wells, relocation of filter fields) reduces or eliminate seffluent plumes reaching the lake. Research on measures to change the flow and quality of effluent plumes could lead to additional mitigation of these growths. Examples of such measures include but are not limited to:

- removing garbage grinders
- flow reduction
- aerobic treatment
- chemical additions to septic tank effluent
- non-discharging toilets
- capture of effluent plumes for lawn irrigation
- laundry detergent phosphate ban (already in effect)
- seasonal modification of groundwater by lake level control.

The Limited Action Alternative would not improve the projected trophic status of Crystal Lake. However, the productivity is expected to remain very low. Beds of aquatic plants near the mouths of tributaries would remain.

Small wastewater pumping units (300 to 5000 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 insure against backups or overflow to the lake. Since the magnitude of spills with the Limited Action Alternative are about two orders of magnitude less than with the Facilities Plan Proposed Action, the possible impacts of equipment failure are much less.

B. GROUNDWATER

The Facilities Plan Proposed Action would eliminate the discharge of wastewater effluents to the groundwaters around Crystal Lake. As discussed above, this would reduce nearshore plant growths stimulated by the enriched groundwaters. The threat of well water contamination from septic tank effluents would be removed. However, actual improvement in the potable groundwater supply would be minor at best. Well water quality, as sampled in 1969, was satisfactory except for high nitrates of undetermined origin in a few wells.

The Limited Action alternative would detect and reduce or eliminate in the shallow groundwater around Crystal Lake. The plumes can change, with time, in size slope, and strength, depending on wastewater or groundwater characteristics. At present, wells day within these plumes, particularly ungrouted wells, could receive nitrate and other chemical loads.

The Limited Action Alternative would eliminate the hazard to drinking water by 1) inspecting existing wells and filter fields, 2) sampling wells that are down gradient or within 50 feet of septic tanks or soil absorption systems, and 3) selecting on-site or off-site measures to stop actual or possible drinking water contamination.

These repair measures might include elimination of dry wells and filter field repair or relocation. Cluster systems sites would receive geohydrologic surveys, and well water would be monitored at regular intervals. In all cases except for new construction on lots with more than 5 feet to groundwater, costs for these measures are included among the analysis or maintenance costs of the Limited Action Alternative (see Appendix B). Also, actual repair (grouting, etc.) of wells may often prove less expensive than treatment modifications.

C. POPULATION AND LAND USE

Population projections used for the design of alternatives in the EIS were based on recent growth trends and data from a variety of sources. The design projections did not incorporate any constraints or inducements due to the amount of developable land or other complex economic, demographic or land use factors.

Examination of development potential as an impact of centralized sewage treatment, however, suggests that the amount of developable land and the density of development will both be greater with sewers than without. Translated into population increases, it is estimated that actual year 2000 population in the existing and proposed service areas with the Facilities Plan Proposed Action would be as much as 19 percent higher than the design population, or 14,860 instead of 12,390 total, in-summer population. In contrast the projection for the Limited Action Alternative is 7 percent less than the design population, or 11,620.

The population projections suggest an increase of 36 to 74 percent over 1975 figures. Because of the different densities at which development is likely to occur, the estimated percent increases in developed land are much closer. For the Crystal Lake service area, residential acreage is projected to increase by 77 percent with the Limited Action Alternative versus 88 percent with the Facility Plan Proposed Action. The amount of new nearshore development would be particularly constrained with the Limited Action Alternative because the stock of land developable with on-site systems is small. Much of the new development would occur on relatively large back lots. In contrast a sewer would give nearshore acreage high development potential and could support commercial and resort uses. If the Limited Action Alternative were chosen, developers might wish to acquire unbuildable shoreline lots as multi-family access and recreation sites.

E. ECONOMIC IMPACTS

The economic impacts of either alternative would be the net benefits of improved water quality on the economy of the community and direct cost to system users.

The City of Frankfort will likely realize the greatest water quality related economic benefits from either alternative. Improved water quality may result in increased use of the City's marina for lake fishing activities and in increased tourism.

Economic benefit may be realized by approximately 180 lakeshore homeowners around Crystal Lake due to disappearance of nearshore plant growths with

the Facilities Plan Proposed Action. The Limited Action Alternative would offer similar benefits to lakeshore owners receiving off-site treatment or substantial system upgrading. This benefit could be realized as increased property resale value, assuming that the present growth is detracting from property values.

The estimated direct cost to system users is the most significant difference between the two alternatives in terms of either environmental or social impacts. The economic impact of these costs is of most consequence for system users in the Crystal Lake watershed. With the Facilities Plan Proposed Action the 1980 average annual homeowner's cost[1] around Crystal Lake would be $718. This figure would drop to $610 if the 20% reserve fund were eliminated. It would drop to $212 if both the reserve fund were eliminated and all sewers in the watershed were determined to be eligible for Construction Grants funding. (Crystal Lake's sewers in the Facilities Plan Proposed Action were preliminarily determined in the Draft EIS to be 40 percent eligible. Nothing has occurred that would increase that figure).

In contrast, the 1980 average annual homeowner's cost around Crystal Lake for the Limited Action Alternative is $95.

The impacts of these user charges can be defined in terms of the percentage of the population facing significant financial burdens and displacement pressure. Significant financial burden is defined as a charge greater than 1.5 to 2.5% of total income depending, the variable threshold rate being 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 IV-1 presents the significant financial burden and displacement pressure rates for the various user charges listed above.

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[1] "Average annual homeowner's cost" includes one residences equal share of his community's 1980 debt retirement cost plus 1980 operating expenses plus a reserve fund contribution of 20 percent of his debt retirement share. To this is added an equivalent annual payment for private costs (such as house sewers) as if they were paid at 6-7/8 percent for 30 years.

Table IV-1

Financial Burden and Displacement Pressure of the
Facilities Plan Proposed Action and the Limited Action Alternative
Crystal Lake and Benzonia

	1980 Average Annual Homeowner's Cost	Displacement Pressure	Financial Burden
Facilities Plan Proposed Action - 40% sewer eligibility and 20% capital reserve	$ 718	50-60%	85-98%
Facilities Plan Proposed Action - 40% sewer eligibility; no capital reserve	$ 610	40-50%	85-98%
Facilities Plan Proposed Action - 100% sewer eligibility; no capital reserve	$ 212	5-10%	30-40%
Limited Action as costed in the Draft EIS	$ 50	1%	5-10%
Limited Action as costed in the Final EIS	$ 95	1-5%	10-15%

Comments and Responses

Substantive comments received on the Draft EIS have been compiled and paraphrased in this section for response. The individual letters received and those from the public hearing are reproduced following this section.

Crystal Comments and Responses(C and R)

Water Quality

C. 1 Several comments related to the nutrient load carried by Cold Creek into Crystal Lake. The Draft EIS lacked alternatives for controlling this single largest source of phosphorus. More generally, it failed to examine water quality control measures unrelated to sewage treatment; and it implied that Beulah sewers or stormwater runoff were the source of nutrients in Cold Creek. [Pastene, Jervis, Bletcher, Manville]

R. 1 The action which is the subject of the EIS is EPA funding of centralized wastewater management facilities around Crystal Lake, in Frankfort and in Elberta. A number of related issues emerged during preparation of the EIS. The inventory and control of non-point nutrient sources, especially Cold Creek, was one. However, resolution of related issues would have required additional time and resources and might have detracted from resolving the initial issues cited on pages 15 and 16 of the Draft.

Cold Creek's role as the single largest phosphorus source should not divert the reader's attention from the non-point nutrient sources found throughout the Crystal Lake watershed. Some, like surface runoff from forested areas, cannot be effectively reduced. Others, e.g. treatment systems near the shoreline, can be eliminated only at great cost but could be controlled at reasonable cost. Appendix C contains a list of control measures immediately available to homeowners.

Another effective tool could be education of farmers and other landowners in regard to soil erosion control and fertilizer usage. The Northwest Michigan Regional Planning and Development Commission and the US Soil Conservation Service offer assistance in the inventory and control of non-point sources. Laboratory facilities built at the new treatment plant serving Frankfort and Elberta could help in a program to inventory and monitor non-point sources in the Crystal Lake watershed.

As discussed on page 60 of the Draft EIS, stream flow and phosphorus data from Cold Creek indicate that non-point sources contribute much to the stream's phosphorus load. The data do not rule out the possibility that sources cited by Tanis (Beulah stormwater, possible sewer leaks) also contribute.

To obtain additional data on possible Cold Creek discharges, Dr. William Kerfoot conducted a "Septic Snooper" Survey in July 1979 from the mouth of Cold Creek to a point north of the Cold Creek sedimentation lagoons. At the time there were no indications that sewers crossing Cold Creek below the settling lagoons were leaking. Readings for fluorescent materials, however, were significantly higher along a small tributary flowing south into Cold Creek just above the settling lagoons. The fluorescent materials which suggest wastewater or organic decay products could have come from abandoned soil absorption systems or the former lumber yard east of Highway 31. The source of fluorescent materials could have been either wastewater or organic decay products from the lush vegetation in the area.

C. 2 The lack of effluent plumes along the western shore of Crystal Lake and explanations of this based on groundwater outflow raise the possibility that private wells may be contaminated by septic tanks in this area. [Jones]

R. 2 Outflow of lake water toward Lake Michigan was confirmed by hydrology studies conducted in July 1979 after publication of the Draft EIS. It is likely that some wells are directly down-gradient from septic tanks and soil disposal units. Given the variable directions of groundwater flow around the lake, there are probably more down-gradient wells in addition to those along the western shore.

This situation does not appear to pose a problem, however. The available well water quality data, reviewed on page 49 of the Draft EIS, show no bacterial contamination of any wells and no higher incidence of nitrates than in any other segment of the lakeshore. Indeed, the highest incidence of elevated nitrates was along the north shore where groundwater flow is predominately toward the lake.

Inspection and resampling of wells down-gradient from on-site systems or within 50 feet of sewage disposal systems is grant eligible as part of developing the site-specific environmental and engineering data base for design of the EIS's recommended Limited Action Alternative. It is included in costs for the site-by-site work in Appendix B. Use of a septic leachate detector for rapid preliminary analysis of well water samples collected door to door is an inexpensive means for preliminary screening for effluent presence.

Soils

C. 3 The role of the Soil Conservation Service in evaluating lots for installation of on-site systems is explained by SCS's State Conservationist, Mr. Arthur H. Cratty. SCS does not accept, reject, or permit sites for on-site systems. SCS assists the responsible officials by providing soils identification and soils limitations. [Cratty]

R. Comment noted. 3

C. 4 SCS is not preparing a soil survey of Benzie County as stated on page 31 of the Draft EIS. [Cratty]

R. 4 Comment noted.

C. 5 The EIS should not compare soil SCS data with health department data on site suitablility for septic tank systems. The section on soil and soils limitation is not clear, not consistent and should be rewritten. [Cratty]

R. 5 The message of Section II.A.3.a, "Soils Suitability for Septic Tank Absorption Fields", was not clearly stated, it is true. The message is that the three sources of soil suitability information would result in three entirely different conclusions about soil suitability for on-site systems. Within the proposed sewer service area, SCS found all tested

sites to have limitations such as wetness or slow percolation, or to pose pollution hazards to shallow water supplies. If this information were to be used as the sole basis for planning wastewater facilities here, continued use of on-site systems would have been rejected as an option.

Another source of information, health department permit records, indicates that 56% of the sites around Crystal Lake are suitable. Comparison of SCS and health department data was not intended to imply that either agency was right or wrong regarding soil suitability--only that sole reliance on either source would result in different conclusions.

The third source of information, data collected on actual performance of existing systems, yields another conclusion altogether. Extensive field work done for the EIS showed that fewer than 8% of the existing systems around Crystal Lake have ponded or backed up more than once. A 1970 survey of 165 lakeshore wells found no bacterial contamination and only limited amounts of nitrate. Despite the facts that more than half of the existing systems do not comply with current design standards, that all are located in soils with identified limitations, and that most are inadequately maintained, nearly all are working well. The conclusion based on performance data is that continued use of on-site systems should not only be considered as an option but should be selected for implementation as long as appropriate engineering and management techniques are included.

C. 6 In the soil studies provided by SCS, was depth to the seasonal high water table determined by actual water level measurements or by interpretation of soil profiles? [Jervis]

R. 6 The data provided by SCS are reproduced here in Appendix D. Actual depth to water table is provided for many sites in addition to estimated depth to seasonal high groundwater level. The measured depth was in all cases deeper than the seasonal water level. Please note that depth to groundwater under the shoreline lots is directly controlled by lake elevation which is controllable at the lake outlet.

The statement on page 34 of the Draft regarding seasonal high water table is in error as a result of a last minute additional change. The statement implies that all sites tested around the lake had high water tables. Twenty-four of the 74 sites had estimated depths to seasonal high groundwater level greater than 60 inches. The statement on page 34 should read:

> "Shoreline Sites. Soil borings taken by the SCS in Autumn 1978 (by letter, R. Larson, 1 December 1978) from shoreline sites showed that all 74 sites sampled either had limiting factors of a seasonally high water table or slow permeability, or posed a pollution hazard to shallow water supplies."

Field Data Collection

C. 7 The Final EIS should include better descriptions of the Septic Snooper study and the aerial photographic survey. [Bletcher; Jones]

R. 7 Techniques used by EPA's Environmental Photographic Interpretation Center were not described in the Draft EIS. A description is provided in Appendix A of this Final EIS. The EPIC data in Figure II-15 of the Draft EIS did not include the malfunction data. The revised Figure I-3 included in Section I.C. of this Final EIS shows the locations of suspected and confirmed malfunctions.

The methods used for the Septic Snooper study are presented in Appendix C of the Draft EIS. It is sufficiently detailed for the intended audience of the EIS--municipal officials, state and Federal decisionmakers, and the public.

All readers should know that the use of septic leachate detectors such as ENDECO's Septic Leachate Detector is still experimental. Technical questions have yet to be fully resolved concerning the universal presence of brighteners and whiteners in wastewater from individual homes, the effects on plume strength of fluorescent compound absorption by different soils, the effects of plume configuration on plume detectability and correlations between plume strength and nutrient break-through. EPA is conducting additional research on these topics to improve both the applicability of the equipment and interpretation of the data it generates.

Readers should also understand that EPA's conclusion on the acceptability of continued use of on-site systems is based on many sources of the data, not just the Septic Leachate Detector. The Detector is just that--it locates plumes for sampling by conventional methods. It was not used in the EIS process in any other way then to locate individual plumes.

C. 8 EPA and Michigan Department of Natural Resources use different assumptions regarding phosphorus input to lakes from shoreline septic tank systems. The difference in loading could be high in some cases. [Czuprenski]

R. 8 Both agencies' methods use assumptions which will seldom, if ever, be valid for all lakes or for all dwellings around a lake. For instance, both methods assume that effluents from all lakeshore dwellings will reach the lake. The Septic Snooper studies on Crystal Lake and 34 other glacial lakes in EPA Region V show that this is not the case except in very unusual situations. The results from both methods are, therefore, likely to be conservatively high.

Another important assumption is the breakthrough rate, i.e. the percentage of phosphorus discharged from any system to the soil which will end up in a lake. The EPA National Eutrophication Survey used a loading of 0.25 lb./capita/year, equivalent to about 8% breakthrough. According to the commentor, Michigan DNR bases breakthrough on the phosphorus absorbing capacity of local soils. The commentor cited a figure of 45% for soils in Oakland County.

While the Michigan DNR method incorporates at least some locally relevant data, neither method provides more than a rough, conservatively high estimate of septic tank loading to lakes. In many planning situations, an estimate by either method may suffice. However, when expensive engineering or management decisions rest on such estimates, the decision maker should get local field verification of the assumptions, and not fret over the superiority of one agency's assumptions over another's.

Appropriate field verification methods are being developed and demonstrated by EPA. As mentioned above, several studies designed to resolve technical questions regarding effluent plume detection are planned for spring and summer 1980. A new technique to better determine the strength and configuration of subsurface plumes at the shoreline is also going to be evaluated.

C. 9 Did the aerial photographic survey performed in summer 1978 by EPIC miss surface malfunctions because of foliage? [Jones]

R. 9 The draft EIS noted this possibility. Whether there were any other malfunctions active at the time of the overflights cannot be accurately assessed.

The commentor implied, as others have directly stated, that summer is not the best time of year for this type of survey. This is true for two reasons--the possible interference by foliage and the higher like-lihood of surface failures in spring. Optimal timing of this and other field studies was not feasible.

C. 10 The sanitary survey was conducted during September and October when few of the seasonal residents would have been occupying their dwellings. The survey should have been conducted during summer months. [Jones]

R. 10 The best time to conduct a sanitary survey in a recreational community is early summer when evidence of temporary (spring) malfunctions would still be apparent and when the greatest number of residences will be occupied.

It is not true that few seasonal residents were surveyed. In the Draft EIS page 5 of Appendix F-1 states: "Although the survey took place in October, seventy-six percent of the homes surveyed were seasonal, i.e., used less than ten months of the year..." How many of these "seasonal residences" are used only during summer was not stated.

Alternatives

C. 11 Engineers felt that costs estimates for various facilities were too low and that the level of design detail for the EIS alternatives was not comparable to what is expected in a facilities plan. [Force, Jones, DPW]

R. 11 EPA recognizes that the level of detail in design and costing used in preparing the EIS is not as refined as may be expected by the state, especially for a selected alternative. The costs also do not reflect the highly inflated costs of centralized facilities in Michigan.

However, the costing methods used were consistent from one alternative to the other. The cost rankings of the EIS alternatives and of the Facility Plan Proposed Action as recosted for the EIS are unlikely to change. EPA feels that no amount of increased design and costing effort is going to change the basic conclusion that continued use of on-site systems in the Crystal Lake area is cost-effective compared with centralized systems.

C. 12 Specific questions were raised regarding the cost of detailed site evaluation, operation and maintenance, and cluster system construction. All of these comments suggested that the present worth of the recommended Limited Action Alternative as presented in the Draft EIS is low. [Jones, Force, DPW]

R. 12 Lacking any cost data based on experience, the Draft EIS assumed that the 25% engineering and legal contingency rate used for conventional sewerage facilities could also be applied to the Limited Action Alternative. While there are still no hard data available, a more detailed estimate has been made of the costs for a detailed site evaluation. This would constitute the largest part of contingency costs for the Limited Action Alternative. Assuming the 1384 unsewered build-ings in the Proposed Service area surrounding Crystal Lake would be sur-veyed, the site evaluation cost is estimated at $501,700. See Appendix B for details and assumptions. This compares to $321,000 for the 25% contingency factor on the construction of on-lot repairs and cluster systems in the Limited Action Alternative.

Operation and maintenance costs for unsewered areas were based in the Draft EIS on information provided by decentralized facilities management agencies in California and Washington. These agencies reported varying levels of services and costs. From the agency information, $30 was selected as the cost for inspection and administration. $50 every five years for septic tank pumping was selected for O&M of on-site systems. More detailed estimates have been prepared since publication of the Draft EIS. The new details and assumptions are presented in Appendix B. These conservatively high estimates result in a 1980 O&M of about $81 per year per household compared to $40 per year with the O&M assumptions used in Draft EIS.

Construction costs for cluster systems were based on assumptions that were felt to be valid for their intended use in the Crystal Lake area. These assumptions include moderate housing density (75' road frontage on one side of a road) and close proximity of suitable soils. Any number of factors can be suggested which would result in higher costs per household. However, until the need for off-site treatment is demonstrated on a site specific basis, and actual field data are available for cluster system design, revision of the cluster system costs is unfounded. The revised cost estimates for detailed site evaluations and O&M will increase the costs of the Limited Action Alternative above those presented in the Draft EIS. The present worth increases from 7,218,100 to $7,887,200 or 9%. (Please note that the present worth of the Limited Action Alternative was over estimated by $231,100 because the salvage value of future on-site systems was calculated improperly.)

Average annual local costs for Crystal Lake households would increase from $49 per year to $95 per year.

Please note that the proper performance of cluster systems is dependent not only on careful construction, like any on-site system, but also on quality of actual materials operating experience in the rest of the country suggests that septic tank effluent pumps should probably have rotors and fittings of at least "300" grade stainless steel.

By comparison, if all Facility Plan sewers around Crystal Lake were eligible (the Draft EIS estimated 40% eligiblity), the average annual local costs for Crystal Lake households would be $273 including a 20% capital resource contribution, approximately three times the re-estimated household cost for the Limited Action Alternative.

C. 13 A more detailed breakdown of the assumptions and costs of the Limited Action Alternative including future costs should be provided. [Jones]

R. 13 This information is presented in Appendix B and summarized in the text of this Final EIS.

C. 14 The reliability of on-site and cluster systems cannot be determined and does not provide a long-term solution to wastewater needs in the Crystal Lake watershed. [Force, Jones]

R. 14 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 Crystal Lake 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.

The Draft and Final EIS's recognize that some segments and individual homes may not be upgradeable to provide reliable wastewater treatment. Costs for the Limited Action Alternative, therefore, include six cluster systems to serve 125 residences. An inspection of possible cluster system sites was requested of and provided by the Soil Conservation Service. Detailed hydrogeologic investigations of any proposed cluster system sites will be required prior to approval and installation.

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 Crystal Lake 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 judgment, 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.

C. 15 A cost-effective analysis of septage disposal options was not presented in the Draft EIS. [Force, Jones]

R. 15 Again, the EIS's level of detail in design and costing was not intended to satisfy all facilities planning requirements.

The need for proper disposal of septage and two disposal options appropriate for different EIS alternatives were discussed on page 117 of the Draft EIS. In alternatives which involve use of septic tanks, pumping once every five years at a cost of $50 per pump was included in the cost-effectiveness analyses. This cost includes $15 for either land application or treatment in the Frankfort-Elberta STP. Selection of this cost was based upon a review of literature dealing with septage disposal.

C. 16 The Draft EIS's estimated cost for a 0.32 mgd wastewater treatment plant at Frankfort is low. EPA should prepare a revised cost estimate based on 1979 bids for similar work in Michigan. [Force]

R. 16 The commentor's analysis of this cost is based on a Facility Plan estimate of $2,746,000 for a 0.32 mgd treatment plant. The Facility Plan, however, shows a 0.44 mgd plant for this price (Alternative 4, pages 6-24 of the Facility Plan).

Treatment plant costs in the Draft EIS were based on a combination of EPA cost curve data for small treatment plants and data from the Facility Plan. Costing procedures were the same for all alternatives.

This comment raises an issue which was not addressed in the EIS--the unusually high costs of wastewater facilities in Michigan. Unofficial comments have been made that use of cost curve data is not valid for Michigan projects because of locally inflated prices. To the extent that this is true, decentralized facilities may save even more than estimated in the Draft EIS.

IMPLEMENTATION

C. 17 The Draft EIS does not provide sufficient information concerning the number of on-site systems needed to prepare a true cost-effectiveness analysis of the recommended Limited Action Alternative. The Draft EIS recommended that the detailed site evaluations for Crystal Lake be prepared in Step 2 of the Construction Grants sequence. These evalua-

tions are necessary for proper cost-effectiveness analysis and should, therefore, be done in Step 1. It is recommended that the evaluations be conducted prior to finalization of the EIS. [Hinschon, Jones]

R. 17 The data collected on Crystal Lake's on-site systems is more extensive than is 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 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 (EIS Alternatives 3 - 6 and the Limited Action Alternative), 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 reexamined for this Final EIS in more detail and with conservative estimates. (See Comments and Responses on Alternatives.) 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 E.) 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.

C. 18 The Draft EIS does not indicate whether EPA's requirements for justification of advanced secondary treatment at the Frankfort-Elberta plant have been met. [Force]

R. 18 In the past three months, the Michigan Department of Natural Resources has revised effluent standards for discharge to Betsie Lake. Instead of a BOD limit of 10 mg/l and suspended solids limit of 10 mg/l, secondary treatment (30 mg/l BOD and 30 mg/l suspended solids) will be allowed. Michigan DNR's correspondence on this is included as Appendix F.

The large reduction in phosphorus load to Betsie Lake that would result from chemical additions and filtering of the Frankfort-Elberta plant's

effluent was discussed in the Draft EIS. The phosphorus limitation of 1 mg/l is predicted to improve the trophic status of Betsie Lake. Chemical additions to the effluent for phosphorus removal will have the side benefit of reducing BOD and suspended solids below 30 mg/l BOD and 30 mg/l suspended solids under most operating conditions.

The change in BOD and suspended solids limitations removes the need for final filtration of the effluent. The microscreen proposed in the Facility Plan and adopted in the EIS for the Frankfort-Elberta plant is, therefore, not necessary. The microscreen would reduce the effluent phosphorus concentration from 1 mg/l but the expense is not justified by the 3% lake load reduction.

C. 19 Division of the project into two parts, a municipal treatment project and a rural lake project, may jeopardize solution of Crystal Lake's water quality problems because the latter are less obvious and more difficult of solution. [Bletcher]

R. 19 Michigan DNR has informed EPA that the two projects have been assigned new priority numbers and that both are high enough to receive additional funding without delay.

C. 20 The Michigan Environmental Review Board adopted the Draft EIS with the proviso that the planning for the Village of Beulah be coordinated with the study for the Crystal Lake Area. The President of the Village of Beulah, however, has clearly stated that the Village will not participate in any future projects elsewhere around Crystal Lake. [Env. Review Board, Michigan Environmental Board Manville]

R. 20 In the recommended Limited Action Alternative there is the possibility that detailed site analysis and geohydrologic studies will show sewering the northeast and southeast shores of Crystal Lake to the Beulah system to be the optimum solution for these identified problem areas. Because of this possibility, it is hoped that the Benzie County Department of Public Works and the Village will maintain a cooperative relationship.

Based upon the fact that the Beulah treatment and disposal lagoons have been hydraulically overloaded in the past, they probably could not handle the additional flows without upgrading the lagoon system.

C. 21 Two comments dealt with the legal authority for establishment of an entity to provide the community supervision of decentralized facilities. One cited the relevant Michigan Public Acts (40, 185, and 342) and the Michigan Public Health Code as providing necessary mechanisms for a small waste flows district. The other stated that Michigan has no statute authorizing units of local government to manage waste facilities other than those connected to conventional collection systems, but then concluded that a special management agency is not really necessary for upgrading and maintaining on-site systems. [Jones, DPW, Intercom]

R. The 1976 study by Otis and Stewart indicated sufficient management authority already existed under Michigan law. Preliminary legal surveys by a number of the 208 region water quality management agencies indicated that authority to manage decentralized wastewater treatment systems. Preliminary discussions with Michigan DNR staff and the Michigan Attorney General's office suggests that existing public health and police powers allow a county to obtain access and maintenance authority by passage of a county ordinance; a written Attorney General's opinion is being requested to clarify this portion of the question. In addition Concerns about legal authority and interagency conflicts were raised in the Draft EIS. Several questions relevant to local options were posed on page 141 of the Draft EIS. A sequence of steps, including a broad outline on management organization design, was also presented.

EPA is reluctant to recommend specific resolutions for these concerns because so many management options are available. Local citizens and elected officials should evaluate, decide on one and implement it at their own initiative.

There was nothing explicitly stated in the Draft EIS about a new agency. Depending on the results of the site specific evaluation, the actual wastewater technologies selected, identification of functions to be provided and analysis of the capabilities of existing organizations, it may well be that the only legal instrument needed is a memorandum of understanding between the Benzie County Department of Public Works and the Grand Traverse-Leelanau-Benzie District Health Department and a contract with Frankfort for water sample analysis at the new treatment plant's laboratory.

Included in II.B.2. is a discussion of three possible levels of management approach possible for Crystal Lake water quality and wastewater treatment management. While EPA can recommend an approach, final selection of any one or a combination of these is up to the applicant.

On the other hand, it might also turn out that difficult legal, jurisdictional and personnel problems will be encountered. It is unlikely that such problems will be unique to Crystal Lake or to Michigan. EPA wishes to encourage the spirit expressed by one of the commentors: "...if we must do it first at Crystal Lake, then let it be here." EPA believes it can be done, that the benefits are worth the cost and that Crystal Lake is an excellent place to start.

C. 22 Another potential problem, cited by the applicant, is the possibility of jurisdictional conflicts with the Tri-County Health Department. [DPW]

R. The health department should be a valuable resource in terms of legal authority and technical expertise.

Present State health department policies, as expressed in response to the Draft EIS for a similar project in Emmet County, are dependent on State codes and standards. The approach proposed in the Limited Action Alternative is dependent on local data regarding performance of existing

systems. The State's approach is entirely appropriate as a basis for permitting on-site systems for new buildings. State and local health authorities may exercise whatever constraints they are legally enabled to use in order to minimize the somewhat unpredictable public health and economic risks resulting from system failure. In the case of existing on-site systems, the risks, including the economic risk of building a new sewer system, can be quantified by direct measurement and objective environmental and engineering analysis. We believe we have used the latter approach in the Draft EIS and recommend it to the applicant and other interested parties when considering the fate of either individual on-site systems or an entire community of them.

C. 23 Seasonally used, privately owned on-site systems do not qualify for Federal grants for repair, renovation or replacement. Since the population along the shoreline of Crystal Lake consists mainly of seasonal residents, Federal assistance may not contribute to correcting existing problems. [Intercom]

R. 23 About the same time that the Draft EIS went to press, EPA Headquarters issued Program Requirements Memorandum 79-8, which states:

> Perpetual or life-of-project easements or other binding covenant running with the land affording complete access to and control of wastewater treatment works on private property are tantamount to ownership of such works.

Therefore, seasonally used, privately owned on-site systems can qualify for funding.

C. 24 Easements must be obtained for both publicly and privately owned systems giving the Department of Public Works access for inspection and maintenance. Some property owners may not voluntarily grant these, particularly where cluster system drainfields are concerned. [Intercom, DPW, Jones]

R. 24 The access issue can be discussed for three cases: on-site systems for which access is voluntarily granted by the property owner; on-site systems for which access is not voluntarily granted by the property owners; and off-site systems.

The legal authority of the Benzie County Department of Public Works to enter into voluntary easement agreements is the same as that of any other person, corporation or public body to enter into a contract. The DPW can maximize cooperation from homeowners and landowners by setting up and advertising standard operating procedures so that individuals know what to expect. For routine operations such as septic tank pumping, inspecting the drainfield area or drawing well water samples, a guarantee that adequate notification will be provided would reduce anxieties about infringement on privacy. For emergency operations, suitable procedures could be established.

Despite the community and private benefits of having community supervision of on-site systems, some property owners may not want to participate in the "system."

First, these owners can be excluded from receiving the services of the DPW. When and if their on-site facilities fail, repair or replacement would be at their own initiative and expense. As is currently the practice for low-lying lots around Crystal Lake, the health department may automatically require installation of a holding tank. One problem with this response is that, without periodic inspection and monitoring, future failures may go undetected for long periods. Complaints from neighbors or self-reporting would be the only means of detection.

Another response might be to require all buildings within the DPW's service area to participate and grant easements. If the DPW were to operate a gravity sewer system, there would be no question about legal authority to require hooking up. However, gravity sewer systems do not require permanent easements. This difference is the basis for questioning the legal authority of public bodies to provide small flows management (See previous Comment and Response). This legal issue would have to be resolved if the DPW opts for mandatory participation.

The acquisition of property rights, either by ownership or easement, to land for off-site treatment facilities is legally comparable to acquiring property for gravity sewers. Taking of property from owners who may not benefit from the new facilities should be carefully weighed against the need for the facilities and the possibility of using alternatives that might burden the benefitted owners instead. Because of property rights issues and cost, off-site treatment, such as by cluster systems, is not a panacea for every difficult on-site problem but should be viewed as a technology available for use where on-site measures prove to be unfeasible or prohibitively expensive.

The mechanics of acquiring voluntary on-site easements have been explored by local citizens and EPA. A sample easement form has been prepared by and is included here as Appendix G. Completion of easements on a segment-by-segment basis, starting with the segments appearing to have the most serious problems, has been suggested as a way to expedite the Construction Grants process for Crystal Lake. The cost estimate in Appendix B for the site specific analysis includes time in the initial sanitary survey for introduction of the easement forms
and discussion of easement requirements.

In other states, existing public health and regulatory powers have allowed counties to pass laws giving sanitarians or small waste flows districts access to all on-site systems and authority to require repair and upgrading. To a considerable extent these powers are already exercised by local sanitarians in Michigan. EPA Headquarters has indicated that such a law would be the kind of binding commitment tantamount to public ownership, and that if this were done, no easements at all might be required. Development of a way to do this might be an important result of DPW cooperation with the health department. Preliminary discussion with Michigan DNR and the Attorny General's staff suggests that existing police and public health powers are sufficient to allow passage of such a county law. An Attorney General's opinion is being requested.

C. Administration and management of the Limited Action Alternative means
25 more government intrusion in people's personal lives. [DPW]

R. 25 The issue of privacy was not addressed in the Draft EIS but is certain to be of interest to homeowners and tenants. A discussion of privacy is presented here to stimulate consideration of means to maximize privacy while still meeting the environmental goals of the Limited Action Alternative. The Benzie County Department of Public Works in making this comment has demonstrated its sensitivity to this issue.

The amount of money they must pay for wastewater treatment, in whatever form, could be considered one measure of intrusion into peoples lives. On this basis the Limited Action Alternative is less of an intrusion than any alternative except No Action.

For the resident whose on-site system is causing no problems and meets current design standards, short term intrusions will include a one or two hour interview and site inspection during the site specific evaluation and possibly a return visit for well water sampling. Continuing intrusions would include periodic (one to three years) site inspections by a surveyor, routine septic tank pumping every two to five years and, for lake shore dwellings, possible groundwater and surface water monitoring activities along their beach. Some of these residents may be requested to allow well sampling at the same time as the site inspection. As with other intrusions discussed below, notifying the resident in some way such as by newspaper notices, citizen's group activities, or mail can minimize the effect of these intrusions.

For certain of the systems needing repair, replacement, or upgrading, continuing intrusions would also be greater than with properly designed and operating systems. On-site pumping units need inspection and maintenance perhaps once or twice per year. If water flows must be metered for hydraulically limited systems, meter readers would enter the premises perhaps once per quarter. However, the effect would in these few cases be no worse than construction of the house sewer and gravity sewer required for a centralized sewerage system. In general, continuing intrusions will be related to the complexity of the facilities necessary to deal with site limitations; the more complex the facilities, the more maintenance would be required.

Intrusions will be greatest for residences required to install holding tanks. Visits by the pump truck can be embarassing as well as disturbing. This (as well as nuisances and costs) can be minimized by constructing holding tanks with hopper bottoms and riser pipes with quick-lock fittings and by installing flow reduction devices in the house, as described on pages 100 and 101 of the Draft EIS.

Economic Impacts

C. 26 The Department of Public Works will recover the local costs of the project from those directly benefitting. A general tax on the entire County is inappropriate, even though a significant part of the County economy depends on maintaining the quality of Crystal Lake. [DPW]

R. 26 This comment was made by the Department of Public Works. It is noted.

C. 27 Equitable user charges will be difficult to determine and apply. [DPW]

R. 27 Establishing a user charge system should be an element in the complex process of designing the "agency." EPA is preparing detailed discussions of agency design and user charge systems as part of a Generic EIS for Wastewater Management in Rural Lake Areas. The drafts of these reports are scheduled to be completed by December 1980.

One single system could be developed based upon one assumption (that no one pays for any service or improvement not actually reviewed) and one local decision (should local share of capital costs be paid immediately, or authorized over an extended period, or left to the individual homeowner to choose?). This would result in the following rate categories:

a. No construction needed - operation and maintenance (O&M) only (inspection & pumping).

b. On-site w. construction - O&M plus local share of capital costs, if authorized.

c. Clusters: Different O&M, plus local share of capital costs, if authorized.

Future needs might move a resident from one of these categories to another.

C. 28 The $50 annual user charge is grossly underestimated. [Jones]

R. 28 Two shortcomings in the cost figures for the Limited Action Alternative have been recognized and addressed above. These two are the cost of the site specific analysis, and annual operation and maintenance. Conservatively high estimates of these costs raise the 1980 individual dwellings' average annual local cost to $95. This figures assumes amortization of the local share of capital costs.

C. 29 These user charges do not take into account service to be provided to vacant lot owners for wastewater management in the future. [Jones]

R. 29 It is not clear whether this comment, made by the same commentor as above, refers to the Draft EIS estimate or his own of $250 per year.

The present worth of all EIS alternatives include the construction and operation and maintenance costs for any future systems needed to serve the design population. The local costs were calculated only for the initial year of operation. Per household O&M costs are expected to decline somewhat over the next 20 years because of new residents sharing in the fixed O&M costs. The local costs estimates include a 20% reserve fund. This would be insufficient to fund the construction of wastewater systems for new buildings but could be used to repair existing systems in the future as needed.

C. 30 The Limited Action Alternative has shifted the cost burden from immediate capital cost (for sewers), which are grant eligible, to operation, maintenance, monitoring, and replacement costs which are perpetual and are not grant eligible. [Jones]

R. 30 This is true. The Limited Action Alternative also removes a subsidy for future development that would be funded by the nation, the State and local citizens. This subsidy can be reinstated by local government by charging $250 per year user charges as suggested by this commentor. This will provide about $215,000 per year for DPW to build "free" on-site and off-site systems for new residents. This amount be would more than adequate to build systems for increased population projected.

It is highly unlikely, however, that the DPW would do such a thing. It is more likely that DPW will provide design and construction supervision services out of its O&M budget and leave construction costs to the builder as has been the practice in rural areas for 200 years.

Because there is expected to be no subsidy for future development, existing residents will have a smaller future burden than new residents. In addition to whatever portion of their mortgage payments is for purchases of their existing systems, existing residents will pay an average of $95 per year, including $81 O&M and $14 debt retirement and capital reserve. Since they will continue to pay the same mortgage with or without sewers, only the $95 charge is attributed to the Limited Action Alternative.

On the average the future resident will have capital cost of $1,300 more than if sewers were available ($2,300 for the average on-site system minus $1,000 that would be paid for a new house sewer). With a 12%, 30-year mortgage, his annual cost would be $161 plus $81 for O&M, or $242 total. This is still at least $30 per year cheaper than with a fully grant eligible sewer system.

C. 31 The Draft EIS uses county-wide data to discuss employment and income data of the Proposed Service Area population. [Jones]

R. 31 Problems with the applicability of available socioeconomic data to both the EIS Study Area and the Proposed Service Area are clearly stated on page 84 of the Draft EIS. The almost complete lack of employment and income data for the seasonal population is stated on page 88.

The only accurate way to acquire this type of data is by a special census. This obviously was not conducted for this EIS. In addition, the Office of Management and Budget (OMB) in Circular A-40 requires prior approval of any information-gathering by Federal agencies contacting more than 9 people. OMB approval time is currently more than 18 months. EPA will be considering the advisability of funding special surveys for other rural wastewater projects.

Recreation

C. 32 Consideration should be given to any recreation benefits which might be derived from the project. [Jervis]

R. 32 When the Facility Plan was published in 1976, applicants for construction grants were not required to identify potential recreational opportunity deriving from Federally funded wastewater facilities. Recreational opportunities are not an issue of this EIS.

The Clean Water Act of 1977 and regulations implementating the Act require consideration of open space and recreational opportunities of Federally funded wastewater facilities. Future grants for both the Frankfort-Elberta project and the Crystal Lake project will include the requirement to do so. Particular opportunities to be addressed include use of the abandoned Frankfort treatment plant structures in conjunction with the adjacent Mineral Springs Park, perhaps as a nature education facility. Both active and passive uses of cluster system sites should also be addressed.

C. 33 Mineral Springs Park and Marina, Benzonia Kiwanis Park and Betsie River Access are three Federally funded park facilities in the Study Area. Any modifications of these parklands will require review of the action in accordance with the Land and Water Conservation Fund Act. [Jervis]

R. 33 Comment noted. This will also be incorporated as a grant condition. There is, however, no indication that any such modification is likely.

Archaeology

C. 34 An archaeological survey of any sites that may be disturbed by the recommended alternative should be included in the Final EIS. [Jervis]

R. 34 Only a few specific portions of the Limited Action Alternative have even the potential for archaeological impacts. There are several reasons for this:

1) The Frankfort and Eberta sewer systems has already been constructed.

2) Almost all of the present Crystal Lake shoreline was submerged before 1873.

3) On-site system locations have already been disturbed.

The areas of possible concern are those away from the lake, notably the sites of the cluster system filter fields. When the preliminary location of these filter fields has been decided an archaeological survey will be performed. Should any sites of interest be found, the fields or other contributions will be relocated. All contributions will avoid the four identified archaeological sites described on page 96 of the Draft EIS.

The EIS Process

C. 35 The National Environmental Policy Act has been misapplied by EPA and has become a facilities planning task performed at the Federal level rather than an evaluation of the selected alternative contained in the original Facility Plan. This is a serious encroachment on the rights and duties of the local and state government agencies, responsible under the Clean Water Act and EPA regulations for facilities planning. [Bletcher, Hinschon]

R. 35 Nothing in NEPA limits the government to evaluation of a selected alternative in an EIS. Section 102. C. iii specifically includes "alternatives to the proposed action" as a part of every EIS. The most recent EPA and CEQ guidelines for preparation of EISs pointedly emphasize the importance of evaluating alternatives. Alternatives to be considered are not limited to those administrative alternatives (i.e. grant or no grant) available to the Federal agency preparing an EIS. Any measure which insure that the purposes of NEPA are recognized in Federal decisionmaking can and should be considered in an EIS. USEPA would be of little use if it did not consider all alternatives that might work well.

As to encroachment on state and local agencies, both the State of Michigan and Benzie County requested that this EIS be prepared. Indeed, the State has strongly encouraged a Facility Plan level of alternative development.

C. 36 The public participation program for this EIS has not been in accordance with EPA'S own standards. [Bletcher]

R. 36 The public participation program has substantially exceeded the standards in effect while the EIS was being prepared. Public participation has included three public meetings, including a hearing attended by over 20% of all area residents; attendance at more than eight open meetings of applicant agencies with question-and-answer sessions; radio and newspaper interviews, circulation of 600 copies of the draft EIS; and an EIS newsletter running from January 1978 to September 1979. In 1979 USEPA issued guidelines for an expanded public participation program for EIS's completed several months after Crystal Lake. Many elements of these guidelines were already incorporated in the Crystal Lake project. It is, however, not possible or desirable, to retrace work already alone in order to retroactively apply a few portions of the new guidelines.

C. 37 The Draft EIS fails to meet minimal EPA and CEQ requirements. [Bletcher]

R. 37 As was the case with public participation, new EPA and CEQ guidelines went into effect after the completion of the Draft EIS. Again, many elements of these (concise issue-oriented format, reduced number of pages) were incorporated in the Draft as a matter of common sense. Others like the inclusion of an index have not been.

C. 38 The EIS is inconsistent in evaluating the alternatives using one set of standards for decentralized alternatives and another for centralized alternatives. [Hinschon]

R. 38 The only intentional biases in the comparison have to do with funding and eligibility. In the Clean Water Act of 1977, the US Congress encouraged the implementation of alternative wastewater management technologies. One of the encouragements is an increase in the Federal share from 75 to 85%. This was incorporated in the local cost comparison of the alternatives.

The eligibility of sewers in the centralized alternatives (EIS Alternatives 1 and 2 and Facility Plan Proposed Action) was determined on a preliminary basis to be 40% of estimated capital cost while 100% of the decentralized facilities were considered to be eligible. This also biases the local costs in favor of the decentralized facilities. The sewer eligibility determination was made in accordance with present EPA policy on the funding of collector sewers and with input from the State of Michigan.

It is worthwhile to note that, for Crystal Lake residents, the 1980 average annual household costs at 75% funding and 100% eligibility would be $273 for a sewer and $109 for the recommended Limited Action Alternative.

C. 39 The Draft EIS contains three different population projections for the area under different proposals. The State's understanding of population projections under the 201 program is that the number of people to be living in an area in 20 years is estimated and then alternative ways of addressing their needs are developed. [Hinschon, Force]

R. 39 For the cost-effectiveness of the alternatives in the Draft EIS, one population projection was used. This was stated at least twice - on Pages 99 and 121.

The Draft also recognized that the type of sewer service provided may constrain growth below the projected level or stimulate it above. Therefore, Section IV.C, Population and Land Use Impacts, estimates the impacts on population of centralized and decentralized facilities.

C. 40 The EIS leads one to understand that more people will automatically locate in the Proposed Service Area when sewers or central collection facilities are provided. This seems to ignore all other factors involved in projecting population including employment, the energy situation, etc. [Hinschon]

R. 40 Some large urban areas of this country offer data sufficient to develop an econometric model of population growth. This is not so for rural areas. This does not mean that the factors which will affect rural population growth are not complex. It means that they cannot be complexly analyzed and projected with data available.

The Draft EIS based its quantification of population impacts of wastewater facilities upon the amount of developable land and the density possible with and without centralized sewers.

C. The EIS does not address the possibility of the No Action Alternative
41 for the Crystal Lake area. [Hinschon]

R. An expanded consideration of No Action Alternative costs and impacts is included in Chapter III. Additional needs documentation included the aquatic productivity studies on five sample sites, the groundwater flow survey, and fluorescent scanning of Cold Creek.

Comment Letters

United States Department of the Interior

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

August 24, 1979

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

Dear Mr. McGuire:

We have reviewed the draft Environmental Impact Statement (DEIS) for Alternative Waste Systems for Rural Lake Projects, Crystal Lake Area Sewage Disposal Authority, Benzie County, Michigan, for compliance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the intent of the National Environmental Policy Act of 1969. The document is well prepared; however, there are certain areas which need clarification.

We support the recommended alternative (Limited Action) involving upgrading of on-lot systems where feasible and the collection and upgrading of treatment at Frankfort and Elberta.

It is not clear from the discussion of the suitability of the soils for onsite waste-disposal systems (e.g., p. 34) whether actual water-level measurements have been made or whether conclusions are based on soil profiles alone. Inclusion of a few representative measurements might improve the assessment. (R-6)

Michigan Planning Region 10, including Benzie County, exhibits a low level of need for local facilities as shown in Table 14, page 41, of the 1979 Michigan Recreation Plan (unpublished draft). However, the plan does specify on page 95 that: (R-32)

> Local governments should consider providing recreation opportunities on wastewater treatment plant sites, sewage interceptor rights of way and other related properties and facilities. The Department of Natural Resources funding program for construction of water management facilities presents opportunities to develop recreation uses at little or no additional cost. The department will continue to encourage this through grants administration and facility design review.

This is in harmony with Section 201(f) of the Clean Water Act which encourages "waste treatment management which combines 'open space' and recreational considerations with such management."

Region 10 is an important destination area for recreationists from southern populous regions. This is verified by the report, "Recreation by Michigan Residents - Planning Region 10," a supporting document of the 1979 Michigan Recreation Plan. This report shows a substantial net "import" of recreation participations into Region 10. For this reason, and in harmony with the Clean Water Act and the recommendation cited above, we urge the project sponsor to give consideration to any recreation benefits which might be derived from the project.

(R-32)

The study area includes three parks that have received Land and Water Conservation Fund (LWCF) assistance - Mineral Springs Park and Marina (Projects 26 - 00126, 741, 893, and 1017) administered by the City of Frankfort, Benzonia Kiwanis Park (Projects 26 - 00816 and 1023F4) administered by the Village of Benzonia, and Betsie River Access (Project 26 - 00285 administered by the Michigan Departmment of Natural Resources (MDNR). Should land be required from any of these parks, a Section 6(f) conflict would result. Section 6(f) of the Land and Water Conservation Fund Act states:

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

Any modification of the parklands which may create a Section 6(f) conflict should be coordinated through the State Liaison Office (SLO) who is responsible for administration of the Land and Water Conservation Fund in the State of Michigan prior to initiation of the project. The SLO in Michigan is Mr. O.J. Scherschligt, Deputy Director, Department of Natural Resources, Box 30028, Lansing, Michigan 48909.

(R-1)

The document cites Cold Creek (page 60, table II-6) as contributing 38.8% of the phosphorus load to Crystal Lake. Figure II-12, page 59, shows that the bulk of the phosphorus enters the lake between mid-February and the end of April. This coincides with the peak spring runoff and may be associated with Beulah's storm sewers discharging to Cold Creek.

Earlier in the DEIS (page 42) contained within the section entitled Clean Water Act, it is pointed out that municipalities must provide treatment commensurate with "best available technology" by 1983 and that in appraising their waste management options, localities must address

the control of all major sources of stream pollution (including combined sewer overflows, agricultural, street and other surface runoff). In addition, the proposed EPA Consolidated Permit Regulations, Sec. 122.79 and Sec. 122.82(e), may require that the storm sewers of Beulah be subject to the NPDES permit program, in which case it would seem that the storm water would need treatment, including phosphorus removal.

We recommend that the issue of larger than ambient loads of phosphorus from Cold Creek be addressed in the Final Environmental Impact Statement from the point of view of whether this load should be included in the facilities plan for Crystal Lake.

On page 96 it is stated that the Michigan State History Division would require a survey prior to construction to verify the existence of any archeological sites that may be impacted by the selected alternative. Results of the survey should be made a part of the final environmental impact statement. (R-34)

The definition of aquifer on page 195 should include a qualification concerning the degree of availability of ground water. For example, the definition should specify that an aquifer will yield useful or economically sigificant quantities of gound water.

Sincerely yours,

David L. Jervis

David L. Jervis
Regional Environmental Officer

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF MANAGEMENT AND BUDGET

P.O. BOX 30026, LANSING, MICHIGAN 48909

GERALD H. MILLER, Director

September 6, 1979

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

Dear Gene:

As promised, I am forwarding to you the enclosed report of the Michigan Interdepartmental Environmental Review Committee (INTERCOM) on the Draft Environmental Impact Statement entitled, "Alternative Waste Treatment Systems for Rural Lake Projects, Case Study Number 1." INTERCOM, composed of representatives from all nineteen state departments, adopted the report on September 6, 1979. The report will receive final consideration by the Michigan Environmental Review Board on September 24, 1979.

The Environmental Review Board previously reviewed the Draft Environmental Impact Statement on the proposed Huron Valley Wastewater Control System. I would appreciate receiving three copies of the final EIS on that project at your earliest convenience. Thank you.

Sincerely,

Terry L. Yonker
Presiding Chairman
Interdepartmental Environmental
Review Committee

enc.

MICHIGAN
THE
GREAT
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STATE

REPORT TO INTERCOM

Ad Hoc Committee Review of the Draft Environmental Impact Statement (EIS 216/F/8) For the Crystal Lake Facility Planning Area, Benzie County, Michigan, Prepared by Region V Office of the US Environmental Protection Agency

The draft EIS discusses several waste water management options for the Crystal Lake Planning Area in Benzie county and recommends adoption of the "Limited Action Alternative" which was found to be most cost-effective. Selection of this alternative would eliminate from further consideration a facility plan developed by the Crystal Lake Sewage Disposal Authority under the provisions of section 201 of the Federal Water Pollution Control Amendments of 1972.

Concern about the high cost of implementing the "201" plan, amounting to $8,654 per residence in the planning area, caused EPA to undertake its own study which resulted in the identification of several alternatives and preparation of this EIS.

Synopsis

a. Project Area

The area covered by the EIS includes Lake, Benzonia and Crystal Lake townships, the city of Frankfort and the villages of Benzonia, Elberta and Beulah. Both the city of Frankfort and the village of Elberta operate primary sewage treatment plants which discharge in Betsie Lake. Both facilities have insufficient hydraulic capacity to meet effluent limitations required by the NPDES permits issued by the Department of Natural Resources.

The village of Beulah's treatment works consist of a series of oxidation ponds originally designed to dispose of the effluent via two seepage ponds. Problems of hydraulic overloading in recent years necessitated periodic discharges of treated effluent to Betsie river. The NPDES permit provides for such discharges on a semi-annual basis but they apparently take place more frequently as the community has failed to install the necessary improvements stipulated in the permit. The remaining portions of the planning area lack central collection and treatment systems and are served by individual on-site disposal facilities.

A sanitary survey conducted in connection with the preparation of the EIS indicated that over 50 percent of the on-site disposal systems around Crystal lake were in violation of the sanitary code while a substantial number were found to be leaching effluent into the lake. Except for the vegetation along the shore line which was correlated with the influx of sewage effluent, the water of Crystal lake is otherwise considered to be of high quality.

Of considerable concern is the deterioration of the water quality of Betsie lake where excessive nutrient loading have created serious eutrophic conditions. The major cause of this problem are the non-point pollution sources in the Betsie river watershed tributary to the lake and the effluent discharges from the primary treatment plants serving Frankfort and Elberta.

The majority (approx 60 percent) of the population in the Crystal Lake planning area consists of season resident most of whom are located in the unsewered area surrounding Crystal lake. In contrast, the small urban centers have mostly permanent populations.

b. Proposed Waste Water Management Plan

The Limited Action Alternative selected by the EPA as the preferred system for the Crystal Lake Planning Area would replace the primary treatment plants of Frankfort and Elberta with a single secondary facility discharging into Betsie lake. The plan also provides for rehabilitation of the collection sewer systems of the two communities. The village of Beulah would retain its treatment plant while in the remainder of the area existing on-site systems would be repaired and upgraded. The feasibility of cluster systems or other off-site systems for the northeast and southeast shores of Crystal lake would be considered. The plan further proposes the creation of a small waste flow district in the unsewered portion of the planning area for managing the on-site waste water systems.

Comments

The committee identified a number of inconsistencies and problems with the limited action alternative recommended by EPA.

1. Under the Clean Water Act of 1977, individual on-site and cluster systems are considered "alternative technologies". Repair, renovation and replacement of such facilities are therefore eligible for 85 percent federal cost share, provided they are privately-owned, serving year-round residences or are publicly-owned, year-round or seasonally used. Seasonally-used, privately-owned systems do not qualify. (R-23

Since the population in the unsewered portions of the planning area consists mainly of seasonal residents it would seem that the federal financial assistance program would not likely contribute much to correcting the problems associated with individual on-site systems.

2. Applications for federal grants to finance the rehabilitation or construction of on-site systems must be filed by a public body or governmental entity. EPA regulations (40CFR35) also require the applicant to be responsible for the proper operation and maintenance of the system. The applicant must further certify that there is assurance of unlimited access to each individual on-site system at all reasonable times for inspection, monitoring, maintenance and operation. (R-21 (R-24

Michigan has no statutes authorizing units of local government to manage waste water facilities other than those connected to conventional collection systems. Therefore, it appears that the proposed waste management plan for the unsewered part of the project area is non-implementable unless Act 320 of 1929 is applicable as suggested in the EIS.

3. The EPA recommended plan seems to favor the use of cluster systems in selected areas around Crystal Lake where small lot sizes or soil limitations preclude the installation of individual on-site disposal facilities.

Site conditions are more critical in the design of cluster systems than of sewers. However, it seems that little site-specific information is available to determine

whether cluster systems are technically and socially acceptable in the locations considered for this purpose.

4. In view of the limited impact of the existing on-site system on the water quality of Crystal Lake, it would seem that upgrading of septic tank facilities with implementation of a government-enforced maintenance program would remedy the present problem of aquatic plant growth along the shore without the need of creating a special management agency. (R-21)

5. No problems were found with the elements of the plan dealing with centralized waste water management recommendations.

Respectfully submitted,

Emmanuel T. Van Nierop
Michigan Department of Agriculture

Jan H. Raad
Michigan Department of Transportation

8/30/1979

Adopted by INTERCOM on September 6, 1979

Terry L. Yonker, Presiding Chairman
INTERCOM

August 29, 1979

Mr. Todd A. Cayer
Assistant Division Director
for Construction Grants
U.S. EPA - Region V
230 S. Dearborn Ave.
Chicago, IL 60604

RE: Crystal Lake Environmental Impact Statement, Project No. C262844-01

Dear Mr. Cayer:

We have completed our review of the draft Environmental Impact Statement for the Crystal Lake Area Sewage Disposal Authority, Benzie County, Michigan, and have the following concerns.

The Environmental Impact Statement fails to come to a final conclusion as it does not contain all data necessary to support the alternative recommended therein. The EIS claims that local on-site systems are cost-effective, yet, it does not provide information indicating the number of systems needed, but refers to the fact that extensive on-site analysis will be done in the Step 2 stage. These extensive on-site studies must be done in Step 1 as they are an important factor in developing the cost-effective analysis. Until such time that the exact number of facilities needing replacement or upgrading are known, a true cost-effective analysis can not be completed. (R-

We also wish to point out that the various alternatives considered in the EIS are inconsistent with Appendix A. Appendix A requires that all feasible alternatives and waste management systems shall be initially identified. These alternatives should include systems discharging to receiving waters, land application systems, on-site and other noncentralized systems including revenue generating applications and systems employing the reuse of wastewater and recycling pollutants. In identifying alternatives, it is required that the applicant consider the possibility of no action and staged development of the system. The EIS does not address the possibility of the no action alternative for the Crystal Lake area. (R-

It is our opinion that the National Environmental Policy Act is being misapplied by EPA and has become a facilities planning task performed at the federal level rather than an evaluation of the selected alternative contained in the original facilities plan. (R-3

The EIS is furthermore inconsistent in its evaluation of various systems and the need for such systems. The agency is reviewing the project with decentralized measures under a different set of standards than if a centralized system were proposed. (R-38)

The report contains three different population projections for the area under different proposals. Our understanding of population projections under the 201 program is to estimate how many people will be living in an area in 20 years and then develop alternative ways of addressing their needs. The EIS leads one to understand that more people will automatically locate in the service area when sewers or a central collection facilities are provided. This seems to ignore all other factors involved in projecting population including employment, the energy situation, etc. We would appreciate clarification on this item. (R-40) (R-41)

The State of Michigan agrees with the segmenting of the Frankfort-Elberta areas and has already taken the initiative to prioritize the projects based upon information contained in the draft EIS. Upon receipt of the final EIS and/or revised facilities plan by the authority, the State of Michigan will revise the priority list based on the information contained therein.

It is our recommendation that the additional on-site technical evaluations be conducted prior to finalization of the environmental impact statement at least for the Crystal Lake area so that a true cost-effective solution can be evaluated. It is possible that these studies will show that portions of the lake are not suitable for renovation or upgrading to local codes due to topography, lot size, elevation, and other factors, and that even a more localized breakdown or less extensive service area may be appropriate, i.e. renovate and/or serve only the northeast portion of the lake. Until these issues are addressed, we feel that a cost-effective analysis for the Crystal Lake area has not been properly prepared and cannot be evaluated.

We appreciate being given the opportunity to provide our comments on the Environmental Impact Statement. If you have any questions with respect to our comments, do not hesitate to call.

Very truly yours,

WATER QUALITY DIVISION

Richard T. Hinshon, Chief
Grants Administration Section

RTH/TK:ma
cc: Eugene Wojcik
Elaine Greening
Crystal Lake Area Sewage Authority
Ralph Heiden
Merle Crow

United States Department of Agriculture
Soil Conservation Service
1405 South Harrison Road, Room 101
East Lansing, Michigan
48823

August 17, 1979

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

We have reviewed the draft Environmental Impact Statement, Alternative Waste Treatment Systems for Rural Lake Projects, Case Study No. 1, Crystal Lake Area Sewage Disposal Authority in Benzie County, Michigan. We have the following comments:

On page V under Environment-Soils, the second paragraph indicates the Soil Conservation Service accepts or rejects a site for on-site sewage systems. The Soil Conservation Service provides soils identification and soils limitations. The decision to accept or reject is left up to others. This paragraph also states that the Soil Conservation Service considers excessive permeability to be a limitation to on-site systems. We do consider excessive permeability to be a limitation where the affluent might find its way into water supply systems (wells) or to open waters, such as Crystal Lake. (R-3)

The third paragraph on page 31 indicates the Soil Conservation Service is currently in the process of performing a soil survey for Benzie County; this is not the case. In the fourth paragraph, the last sentence should be corrected to read "The Soil Conservation Service emphasizes that the existing soils data are not specific enough for on-site septic tank evaluations". (R-4)

The last paragraph on page 34; we feel that the purpose and the intensity of the two soils evaluations are significantly different and that they should not be compared. Again, the Soil Conervation Service provides basic soils information and interpretations. The SCS does not issue any permits.

On page 36, we question the advisability of including Table 2-1 in this draft environmental impact statement. The data in this table are not compatible. In general, we feel this section on soils and soils limitations in the draft environmental impact statement is not clear, not consistent and should be rewritten. (R-5)

We appreciate the opportunity to review and comment on this draft EIS and would appreciate the chance to review the final environmental impact statement.

Arthur H. Cratty
State Conservationist

AHC:rwg:rs 5252A

5252A

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF MANAGEMENT AND BUDGET

P.O BOX 30026, LANSING, MICHIGAN 48909

GERALD H MILLER, Director

October 24, 1979

Mr. Eugene Wojcik, Chief
EIS Section
US-EPA, Region V
230 S. Dearborn St.
Chicago, Illinois 60604

Dear Mr. Wojcik:

Enclosed is a copy of the Michigan Environmental Review Board's comments on the draft EIS entitled "Alternative Waste Treatment Systems for Rural Lake Projects, Case Study Number One." This report was adopted with the added proviso that the planning for the waste water treatment system for the Village of Beulah be coordinated with the study for the Crystal Lake Area. (R-20)

A copy of this report will be forwarded to the Governor, MDNR and Michigan A-95 Clearinghouse.

Sincerely,

Boyd Kinzley

Boyd Kinzley, Executive Secretary
Michigan Environmental Review Board

Enc.
BK:mf
cc: Dr. Howard Tanner
Mr. Hank Doerr
Dr. William Cooper
Mr. William Rustem

MERB Review of the Federal Environmental Impact Statement on Alternative Waste Treatment Systems for Rural Lake Projects: Case Study Number 1, Crystal Lake Area, Benzie County, Michigan

by

Bill Cooper
Dick Passero

The draft environmental impact statement brings to public attention several issues that have been previously discussed by M.E.R.B. The Federal Environmental Protection Agency initiated the impact statement preparation following a 201 facilities plan which recommended an extensive sewering system. This alternative would produce the desired level of water quality protection, but at considerable costs in monies and secondary developments. M.E.R.B. engaged in a similar discussion when we reviewed the "Huron River Super Sewer" plan. Since E.P.A. had to initiate the analysis of decentralized alternatives, it appears that the D.N.R. should have developed an interest in alternatives besides intensive hardware solutions. This attitude must be challenged for rural areas like Crystal Lake.

The E.I.S. also discusses the conflict between the Soil Conservation Service and the Department of Public Health concerning the premeability criterion in determining soil suitability for land application of waste water (pg. 34). This issue has arisen several times in the past and deserves resolution. M.E.R.B. recommends that the S.C.S. and the D.P.H. make a joint presentation at our November meeting on the issues of disagreement.

The E.I.S. describes the groundwater hydrology and water quality characteristics on pages 47-52. The E.I.S. also identifies the extensive use of groundwater for municipal drinking supplies (Table II-3). On page D-4 of the Appendix, the statement "however, NPDES regulations no longer apply because the treatment system is groundwater discharge. There are no effluent limits associated with this type of discharge;" raises a number of obvious questions. M.E.R.B. recommends that the D.N.R. present an explanation of the existing procedures for monitoring "groundwater discharges" and itemizes how many of these operations exist in the state.

The E.I.S. states (pg. 106) that the "D.N.R. requires the equivalent of secondary treatment prior to land disposal." The E.P.A. has issued a memorandum that states "A universal minimum of secondary treatment for direct surface discharge... will not be accepted because it is inconsistent with the basic concepts of land treatment." M.E.R.B. recommends that the D.N.R. present a discussion of the merits or conflicts that they perceive with this E.P.A. position.

10/22/79

STATEMENT BY BENZIE COUNTY DEPARTMENT OF PUBLIC WORKS FOR PUBLIC HEARING ON EIS August 6, 1979

It is the desire of the DPW to implement the majority preferences of the public in connection with the Crystal Lake Area Sewage Disposal Project. It is not the intent of the DPW to arbitrarily impose minority views on those who must bear the local share of the cost of the project. (R-26)

One of the DPW basic principles is that the local cost of the project will be paid only by those directly benefiting. A general tax on the entire County is inappropriate, even though a significant part of the County economy depends on maintaining the quality of Crystal Lake.

It is clear, based on data in the EIS, that no other alternative other than the Limited Action Alternative, except possibly Alternative 6, can be justified. Alternate 6 might be justified if additional data supporting it can be developed during Step II work. The choice is between the lessor of two evils: one evil is deterioration in the quality of Crystal Lake; the other evil is the difficulty of administering and managing the limited action alternative, which means more government intrusion in people's personal lives. Nevertheless, the DPW recommends the limited action alternative. (R-25)

The DPW would like to mention some of the problems of the Limited Action Alternative, to show that the problems are recognized, and as an indication that no effort is being made to gloss over these problems. (R-11)

1. Cost may be underestimated. (R-12)

2. Easements must be obtained giving DPW access to septic tanks and drain fields for inspection and maintenance. Some people may not voluntarily do this, particularly where cluster system drain fields are concerned. (R-24)

3. Legalities have not been tested in Michigan courts, but have been tested and established in Colorado and California. (R-21)

4. The Limited Action Alternative is not as long range, permanent solution as sewers would be, and may turn out to be penny wise and pound foolish in the next 50 years. On the other hand, sewers would

tent to increase the population density around Crystal Lake much faster than the Limited Action Alternative, and would be prohibitively expensive compared to the limited action alternative.

5. Jurisdictional conflicts with the Tri-County Health Dept are possible. (R-22)

6. Equitable user charges will be difficult to determine and apply. (R-27)

Notwithstanding the foregoing problems and provided that the Limited Action Alternative is the majority consensus, the DPW will do its best to implement the Limited Action Alternative.

Prolonged discussion advocating other alternatives will be wasteful of time and counter-productive, because EPA will not approve other alternatives unless new data can be developed disproving existing data.

cc: Eberly,Willard

I am Larry Manville, President of the Village of Beulah. It seems you people have done everything in your power to get us to join the sewer authority. At the first meeting I attended, you had our sewer maps, and were just planning on taking them over. I was accused at that time of being against the sewer, gentlemen that is far from the truth. The people of Beulah are not against your sewer, but we are against giving ours up or paying for yours. We participated in phase one,and only phase one of your project, and have no intentions of participating any further. (R-20)

It also seems Beulah is the main culprit on the polluting of Crystal Lake because of Cold Creek. Gentlemen let me inform you only a small part of Cold Creek is in Beulah, most of Cold Creek and the drainage ditch is outside of the Village. We have farming, golf courses, and homes along the creek and the drainage ditch. We feel, if it has not been done, tests should be made all along these streams to determan where, if any, the pollution is coming from. This, then we can say with authority is where the sourse lies. Our sewer lines cross the creek twice, in both places it is above the water, this we have inspected and found in good shape. Last year we televised the sewer in the alley in back of main street where it crosses the creek and grouted and air tested all joints. (R-1)

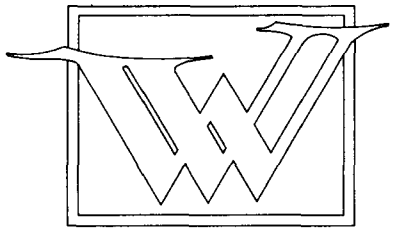
The taxpayers of Beulah have built and paid for their sewer and we voted five mills when we built our Lagoons, this bond issue we hope to pay off in 1981. 1981 is the first year we can pay in advance. This is one big reason we don't feel we should join but most of the reports include Beulah. Second you people are talking of $15 a month sewer charge, and this is not a final or definate charge. The average charge for water and sewer for three months for a family of four is about $20. To have you come in and redo our rates is unthinkable. We are now operating in the black as the State requires and that is all we hope for. (R-20)

Gentlemen we of Beulah have done the only constructive work that has been done. We are not against your sewer or the preservation of the lake, we are only against paying for it, the confiscation of our sewer, and the reference to Beulah being the one polluting the Lake.

Thank you,

Larry Manville
President Village
of Beulah

ENGINEERS / PLANNERS / ARCHITECTS / SURVEYORS / GEOLOGISTS / CHEMISTS • 611 CASCADE WEST PKWY . S E . GRAND RAPIDS, MI 49506 • PH (616) 942-9



WILLIAMS & WORKS

T O WILLIAMS 1861-1941 • F D WORKS 1880-1931 • W B WILLIAMS 1895-1974

August 9, 1979

83742 31

Mr. Gene Wojcik, Chief
EIS Section
Environmental Engineering Branch
USEPA Region V
230 South Dearborn Street
Chicago, Illinois 60604

Re: Crystal Lake Wastewater Project

Dear Mr. Wojcik:

Enclosed are our comments and questions pertaining to the Environmental Impact Study for the above referenced project.

They are contained in a letter to the Benzie County Department of Public Works dated August 1, 1979.

Sincerely,

WILLIAMS & WORKS, INC.

Richard C. Jones, P.E.
Regional Consultant

RCJ/cln
Enclosures

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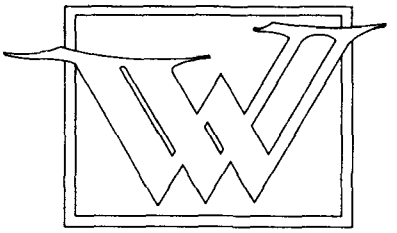

WILLIAMS & WORKS

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August 1, 1979

Mr. Donald Graves, Secretary
Benzie County Department of Public Works
Benzie County Government Center
Beulah, Michigan 49617

Reference: Crystal Lake Wastewater Collection & Treatment Project

Dear Mr. Graves:

At your Board's request, we have reviewed the draft documents of the Environmental Impact Study for the Crystal Lake Area Wastewater Project. Our comments and questions with regards to the review are contained in this letter. Some of the questions that we have raised were answered by Al Krause during your July 20, 1979 DPW meeting. The remaining questions which have yet to be answered are listed in this letter.

In general, our comments pertain to suitability of soils for on-site systems, application of information generated documenting degree of corrective action needed, authority for implementation of the management system, and income of families in the county versus income of people in the service area.

We find that the capital cost of recommended improvements; cluster systems and upgrading on-site systems, for the immediate service area may be off by as much as 100%. To date in Michigan, the only cluster system of comparable size approved and funded by EPA cost in excess of $400,000. This means that the cost of the five proposed cluster systems would exceed costs indicated in the EIS and leave nothing for upgrading the remaining 600 on-site systems that do not meet sanitary code. (R-12)

We find the $50 per year annual user charge fee grossly underestimated. Because of the figures used for other alternatives, we must assume that the $50 per year also includes debt retirement of the local share capital cost of the limited action alternative. Operation and maintenance plus replacement cost for the proposed five cluster systems and approximately 975 remaining on-site systems, would be nearly $300,000 per year. If this cost were spread over all of the developed property, it would be approximately $250 annually per user. (R-28) (R-13) (R-29) (R-30)

These costs do not take into account service to be provided to vacant lot owners for wastewater management in the future. That cost would be shared by the existing service area or be the total responsibility of the owner of the vacant property. In locations where the soil is unsuitable for on-site systems, costs for an acceptable system could be extremely high.

In essence what the limited action alternative has done from a cost standpoint, is shifted the cost burden from immediate capital cost which is grant eligible; to operation, maintenance, monitoring and replacement costs which are perpetual and are not grant eligible.

The "1977 Clean Water Act Amendments" provide for more flexibility regarding types of systems that can be used by rural areas for wastewater management. There is more grant assistance available where innovative or alternative processes can be utilized.

There is the possibility that the foregoing can now make available wastewater management at a more reasonable cost to users of the system. However, one must be careful not to oversell the concepts. It is a situation of trade-offs. Individual on-site systems cannot provide the reliability of a sewer system. On the other hand, based upon the cost figures generated in the EIS as well as information on water quality, one would be led to conclude that a conventional sewer system cannot be justified to serve all of Crystal Lake. We take exception to some of the data gathered and some of the costs presented in the EIS.

In more detail, we have listed below our comments and questions.

COMMENTS

Item No. 1

Throughout the report there is discussion with regards to suitability of soils for on-site systems. There is considerable discrepancy between information generated from Tri-county Health Department records and Soil Conservation Service soils investigations. This leads one to conclude that there are obvious gray areas with regards to whether lots with existing on-site systems and vacant lots have suitable soils for on-site systems. Although the on-site systems that do exist may be functioning adequately at this time, they may in the very near future, not function properly. On vacant lots, where the on-site systems would not be able to be utilized, because of soil conditions or water table, a waste disposal system could be a very expensive improvement, especially if the septic tank effluent had to be pumped to a cluster system some distance away, or there might have to be continued pumping of a holding tank. (R-14)

Item No. 2

An infra-red aerial photography survey was conducted during the summer of 1978. Few surface malfunctions of on-site sewage disposal systems were found. The report indicates that foilage may have hidden from view some failing systems. A sanitary survey was conducted by the University of Michigan during September and October of 1978. The results indicated that over half of the lake shore on-site systems were violating the sanitary code. At this time of the year, few of the seasonal residents would have been occupying their dwellings. This type of a survey should have been conducted during the summer months, or on a holiday week-end. From this we conclude that more than half of the on-site systems violate the sanitary code. (R-7) (R-9) (R-10) Appendix A

Item No. 3

With regards to implementation, it is stated that the concept of public management for septic systems has not been legally tested in Michigan present sanitary codes, however, have been interpreted as authorizing such management by local governments. We can only assume that this was an interpretation by the Environmental Protection Agency and yet has to be tested in the courts. (R-21)

Item No. 4

On page 32 of the Appendix, Item No. 5, indicates that location and characteristics of the emergent plumes suggest direction of water flow is entering the lake in the eastern sections and discharging in the western sections towards Lake Michigan. The low occurrence of plumes along the western shore is related to the predominate outward flow of the region. This may result in keeping nutrients out of Crystal Lake; however, we question what is it doing to ground water that is supplying private wells for residents on the western side of Crystal Lake. (R-2)

Item No. 5

The abstract for Section F-1, indicates that on-site improvements would be necessary. It further indicates, that more than 60% of the homes do not meet current public health regulations, therefore, if there are 1,085 homes on the lakeshore, and 60% have systems that do not meet current health requirements, there are 651 homes that are going to need upgrading. In the limited action alternative there is a capital cost of $1,600,000, (realistic or not) for on-lot systems to be replaced. This is a cost of approximately $2,500 per lot. We know that the cost for a cluster system on a per home or lot basis is far in excess of that figure. (R-11) (R-12)

Item No. 6

On page No. 156 of the report, it states under the Section, "Long-term Impacts", that 5' of soils are ample to remove bacteria, except in very course grain highly permeable material. This may be a debatable item as far as the State Department of Natural Resources Wastewater Division and local health authorities are concerned, but we are not convinced. We suggest that current literature be researched.

Item No. 7

On page 87, the report talks about the characteristics of the population, employment and income. It appears as though there may be a discrepancy between the study area and the service area. The report preparers are trying to use data for all of Benzie County, as a basis, when in fact, they should be using the service area, which is quite different. (R-31)

QUESTIONS

Item No. 1

On page 22, under the section entitled, "Estimation of Costs for Alternatives", it indicates that there is a breakdown of costs listed in the Arthur Beard Report. It would be helpful to have the updated version of breakdown of costs prepared by Arthur Beard & Associates for the cluster systems, and for costs associated with renovation of existing on-site systems, also information with regards to quantity involved and cost associated for each. Al Krause indicated that he will be sending us this information; however, as of the date that this letter was prepared, we have not received it.

Item No. 2

Throughout the report, there is very little information generated within the Village of Benzonia with regards to documentation of on-site system failures. Somehow it was concluded that gravity sewers would not be needed for the Village of Benzonia. Al Krause indicated that within the Village of Benzonia, the site specific study will actually determine what amount of upgrading of on-site systems, or types of systems will be justified. This should be a part of this report.

Item No. 3

On page 168, it states that after selection of a recommended alternative, discussed in Chapter V, that alternative will serve as a baseline for determining the cost effectiveness and thus eligibility. Collection and treatment costs of other alternatives would not be eligible to the extent that they exceed costs for comparable facilities in the recommended alternative. It is our concern that the DPW have access to more detailed base information for the recommended limited action alternative to be able to

make a comparison for eligibility in the future.

Al Krause indicated that with documentation, systems other than upgrading of existing on-site systems can be justified and therefore, be grant eligible. Therefore, only after thorough investigation in the Step 2 phase, or possibly Step 3 phase, can the final eligibility be determined. (R-17)

Item No. 4

In looking at the cost figures for the limited action alternative in Section J-2, there is no indication of how many cluster systems are planned and how many on-site systems are to be upgraded with regards to septic tank, tile field replacement or renovation by the hydrogen peroxide method. There has been no allowance made for growth in the limited action alternative for on-lot systems in the lakeshore area, although in the other alternatives, there is allowance for growth. More specific information is needed to be able to make a detailed analysis. (R-11) (R-12)

Item No. 5

Only 25% contingency is allowed for the limited action alternative for legal, administrative, engineering, etc. It is felt that this percentage is not high enough considering the cumbersome administrative aspects that will have to be dealt with in the area of land acquisition. In addition, a very time consuming site specific study will be required, and the possibility of higher than normal construction contingencies is required because of uncertainties going into the construction phase. Exact condition of marginal operating on-site systems will only be known after they have been uncovered during the Step 3 phase. (R-12)

Item No. 6

What is the boundary of the site specific study area. Al Krause indicated that it would be the same as the immediate service area as proposed in the facility plan. This is also the area that would have to be monitored in the future with regards to affective functioning of systems. It would have to be determined whose responsibility it would be for any replacement or upgrading of the systems in that area in the future. It was indicated by Al Krause that the Department of Public Works must have easements or options on the properties that are included in the study area before the DPW can receive their Step 2 grant offer. (R-24)

Item No. 7

We question whether the EPA Study actually identified malfunctioning systems with their aerial survey. From the information that had been sent to Don Graves in November of 1978, it is obvious that it does not go into much detail. (R-7) Appendix A

Item No. 8

We question the cost per customer served for the limited action alternative as presented. Al Krause confirmed that on the average it is $2,000. This is based on cost information presented in the EIS. (R-11)

Item No. 9

In the study, there was discussion with regards to pumping wastewater from the northeast corner of Crystal Lake to Beulah. We question if there are dollars allowed for improvement of the Beulah treatment facility. Al Krause indicated that there were no dollars allowed for the improvements to the Beulah treatment facility in the limited action alternative.

Item No. 10

Where is the septic tank sludge in the limited action alternative disposed? If it goes to the new Frankfort-Alberta Treatment Facility, are costs allowed for that in estimating the new treatment plant cost? Al Krause indicated that they have incorporated those costs into the construction of the new treatment plant at Frankfort-Alberta. What would be the additional operating cost? (R-15)

Item No. 11

On page 130, there is a detail breakdown of the existing systems indicating percentage of the on-site systems that have to have septic tanks or drain fields replaced, plus those to be treated with hydrogen peroxide. This is information included in alternative No. 3. Is this information used for the other alternatives? Al Krause indicated that it is. Show us what it is for the recommended alternate.

Sincerely yours,

WILLIAMS & WORKS, INC.

Richard C. Jones, P.E.
Regional Consultant

RCJ/LEA

cc: Samuel Eberly
Dayton Willard

ACTIVE PARTNERS
J M HOLLAND D H NOLAND JR R W FORCE
M R VAN EYCK S C WART NBEE R J SMIT
R M BACHTEAL R F BATZER P C YOUNG

RETIRED PARTNERS
R L McNAMEE W S HERBERT J C SEELEY

McNamee, Porter and Seeley

2223 PACKARD ROAD ANN ARBOR, MICH 48104 · AREA CODE 313 769-9220

Consulting Engineers

August 3, 1979

U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60609

Attn: Mr. Alfred Krause

Re: Review Comments on the Crystal Lake Area Sewage Disposal Authority Benzie County, Michigan EIS Prepared by Region V EPA

Gentlemen:

McNamee, Porter and Seeley was the Wastewater Treatment Engineering Consultant for the City of Frankfort and Elberta during the preparation of the Step 1 Facilities Plan. We are also the Consulting Engineers for numerous other communities that are faced with similar problems as were discussed in this EIS. Therefore, our comments fall into two categories. The first category consists of comments relating to the City of Frankfort and Elberta portion of the Environmental Impact statement while the second includes general comments.

I. Frankfort and Elberta portion of the EIS.

1. The EIS recommends a 0.32 mgd wastewater treatment plant (WWTP) for Frankfort at a cost of $2,181,000 based on 1978 costs (see Appendix J-2). The Facilities Plan included a 0.32 mgd WWTP for Frankfort as part of Alternative 4 at a project cost of $2,746,000 (see page 6-24). Based on an ENR index of 2776 for 1978 and 2414 for the time of the original estimate, the cost estimated in the Facilities Plan would be updated to $3,158,000 as a 1978 cost. Therefore it appears that the cost estimates used in the EIS are low. We recommend that EPA prepare a revised cost estimate based on 1979 bids for similar work in Michigan. (R-11) (R-16)

2. The Frankfort NPDES permit requires advanced secondary treatment and phosphorus removal. However, the EIS does not indicate whether the documentation required by PRM 79-7 has been satisfied. (R-18) Appendix A

3. Page 117 of the EIS states that septage would be treated at the RBC plant. If this RBC plant is meant to be the one proposed for Frankfort, the EIS should clearly state that. Neither the Facilities Plan nor the EIS included cost for septage treatment. The quality of septage is not stated in the EIS. There is no cost effective analysis in the EIS to determine if it would be cost effective to treat the septage at the Frankfort-Elberta WWTP or by some other method such as land disposal. Elsewhere in the state, we evaluated septage disposal at an RBC treatment plant and determined a cost of $56.80 per 1000 gallons of septage for treatment at the treatment plant. That figure did not include the pumping and hauling cost. In that project, land application of septage was shown to be more cost effective. (R-15)

4. EPA has indicated an interest in segmenting the Frankfort-Elberta portion of the proposed project from the Cyrstal Lake project. We concur with this and recommend timely implementation of the segmenting.

II. General Comments

1. The EIS lacked sufficient detail on the onsite and cluster alternatives in order to enable an evaluation of whether the systems would function properly. It was also not possible to determine whether all costs associated with such systems were included. Based on our calculations for similar projects in a nearby area, the costs for the onsite and cluster systems is low. (R-11) (R-12) (R-14) Appendix B

2. The level of detail provided in the EIS concerning the basis of design for the alternatives is much less than the Michigan Department of Natural Resources requires in Facilities Plans currently being prepared in Michigan.

3. The EIS does not include a responsiveness summary of the public meetings.

4. The term "Standard Population" should be more clearly explained as well as the method by which it was determined. (R-4(

Very truly yours,

McNAMEE, PORTER AND SEELEY

BY _____
Richard W. Force

RWF:gh

cc: Mr. Dan Post, City of Frankfort
Crystal Lake Authority

HARMON CULHANE, PETERSEN, & BLETCHER

17 August 1979

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

RE: Draft EIS; Crystal Lake Area Sewage Disposal Authority, Benzie County Michigan; Alternative Waste Treatment Systems for Rural Lake Projects; Case Study Number 1. 29 June 1979.

Dear Mr. Wojcik,

We have decided not to submit our review memorandum on the Crystal Lake Study at this time. It seems unreasonable to take you to task for the length of the Crystal Lake EIS in a document that I judge to be eight times the length it needs to be itself.

It is our position that the limited action alternative proposed by EPA for this study area is the correct alternative. It will work, and, we believe, meet the water quality goals that it claims. And, at a greatly reduced cost to the public.

We do not, however, believe this to be an adequate water quality improvement plan for the study area defined as the Crystal Lake Watershed and Lower Betsie River Valley, within the meaning and intent of PL 92-500 and PL 95-217. It does not address water quality matters other than sewage disposal, and it does not propose facility or institutional arrangements to address those matters, as is the clear intent of the Federal legislation. (R-1)

We find the division of this project into two parts, a municipal wastewater treatment project and a rural lake project, by the Michigan Department of Natural Resources for priority list purposes to be totally unacceptable. Such action by MDNR compromises the water quality effort in the study area by dividing the pressing Frankfort-Elberta treatment works problem from the no less important Crystal Lake water quality problem, allowing the less obvious and more difficult of solution problem to attempt to forge ahead on its own, without the driving force of the readily apparent present danger to water quality in Betsie Lake and Lake Michigan posed by the Frankfort plant. We find, in addition, that MDNR took this action without notice or hearing as required by State and Federal Law. (R-19)

Participation by the public in this decisionmaking process has not been in accordance with EPA's own standards for Citizen information, education, and participation. The efforts of Mr. Al Krause, the EPA Project Officer, to bail out this particular turkey are to be highly commended, mitigated only by the fact that he has been responsible for this EIS effort from its inception, and a lesser effort earlier on might have achieved a better result. EPA needs to address these matters in the Final EIS for the benefit of the Step II process, which we hope will include excellent citizen information, education, and participation elements. (R-36)

We believe that EPA has, in the Crystal Lake study, prepared an alternative facilities plan, and not an environmental impact statement. That a good result, and an economy for the Benzie County DPW, have come from this irregular practice ought not to detract from this serious encroachment on the rights and duties of the local and State government agencies, responsible under the Federal statute and EPA regulations for Water Quality Facility Planning. (R-35

The Final EIS should include a description of the techniques used in the study--The Septic Snooper, and Aerial Infrared Photography--that rises above mere journalism, and shows that the writer had some knowledge of the scientific method. The link should be forged between hypothesis, data, theory, and proof in a credible and reproducible way, and that substituted for, among other things, the endless reproduction of Septic Snooper chart paper in the Draft EIS. (R-7) Appen A

The Draft EIS's financial and institutional analysis section, which is factually in error on several points, and incomplete and poorly done in its entirty should be deleted from the Final EIS and replaced with the excellent and accurate institutions and financing study prepared for the Michigan 208 Planning effort by Miller, Canfield, Paddock, & Stone of Detroit Michigan, a firm of expert and qualified Michigan municipal bonding counsel. We are not aware that Miller, Canfield has updated this study to include the effect of the Headlee Amendment to the Michigan Constitution in 1978, but that should be included in the final EIS as well.

Taken as a Facilities Plan, the Draft EIS is incomplete, vague, and generally weak on economic, land use, and environmental matters of great concern in this project area. Taken as an environmental impact statement, it fails to meet minimal EPA and CEQ requirements for a valid EIS--on some of the same matters, and others of technical interest such as length and apparatus. It is hard to suggest a way out of this dilemma, and I am glad that that is EPA's task and not mine. (R-37)

The McNammee bathymetric map of Crystal Lake, prepared in 1943, shows that some 20% of Crystal Lake is eligible for eutrophic action. These areas are those with other major water quality problems other than shallow water--densely developed shoreline, Cold Creek inflows, and so forth. Shortsightedness and inaction can easily destroy this priceless water and related land resource. Proceeding with the limited action alternative on both the municipal and lake fronts is the most important next step for EPA, the MDNR, and the Benzie County DPW. Fixing the Facilities Plan and The EIS will not help water quality in Benzie County one bit.

Very truly yours,

Thomas E. Bletcher

Thomas E. Bletcher
Senior Partner

815 South First Street
Ann Arbor Michigan 48103

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Johnson & Anderson, Inc.
Consulting Engineers
Design and Engineering Division

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Telephone 313-334-9901

J&A Group

July 19, 1979

Mr. Gene Wojcik, Chief
Environmental Impact Statement Section
Environmental Engineering Branch
U.S. EPA Region V
230 S. Dearborn St.
Chicago, Illinois 60604

Dear Mr. Wojcik:

In response to studying the Draft E.I.S. for the Crystal Lake Sewage Disposal Authority, Benzie County, Michigan, I would like to offer the following comments:

1) The analysis of decentralized alternatives (involving substantial on-site upgrading) and their management approaches is excellent and should be mandatory in the development of a Facilities Plan; rather than allowing the usual cursory examination of such worthy alternatives.

2) The analysis of flow reduction and water conservation techniques in alternate sewer designs was very impressive in terms of hindering the likely adverse impacts on the lake from future watershed development. Again, an honest (rather than a cursory) examination of these techniques should be required of the applicant in the Facilities Planning stage instead of the E.I.S. stage.

3) For analysis of sewering in the vicinity of a lake, a practical nutrient budget (including on-site soil evaluations; dye/smoke testing; groundwater, surface and well water sampling; and the use of the ultraviolet fluorescent "septic snooper", to detect the septic system effluent actually entering the lake) should be a must in order to protect such an important and valuable ecosystem.

4) Guidelines should be specified by EPA on both theoretical and practical nutrient budget development for use in Facilities Plans as well as Act 314 Lake Restoration projects. The biggest discrepancy lies in the theoretical input of nutrients (R-8)

Johnson & Anderson, Inc.
Consulting Engineers
Design and Engineering Division

to the lake from shoreline septic tank systems. For example, the EPA National Eutrophication Survey recommended a value of 0.25 lb/capita/year of total phosphorus as that which would leach from soil disposal systems within 300 feet of a lakeshore (p. 60 of Crystal Lake D.E.I.S.). However, MDNR recommends that only a 200 foot shoreline envelope be used to count septic systems; and furthermore, recommends that the total phosphorus leaching to the lake be calculated by multiplying 1.8 lb/capita/year (Vollenweider, 1968) times a percentage figure based on the soil's phosphorus adsorbing capacity. For soils around lakes in Oakland County this % figure is often 45%, thereby resulting in a phosphorus load of 0.81 lb/capita/year; or more than 3 times the load suggested by the National Eutrophication Survey. Hence, the potential for sewering around a lake is three times as great with the MDNR recommendations as with the EPA recommendations! For proper environmental protection, clarification on this point is needed.

Sincerely,

JOHNSON & ANDERSON, INC.

Michael A. Czuprenski

Michael A. Czuprenski
Environmental Engineer/Planner

MAC:ls

UNIVERSITY OF WISCONSIN–MADISON

DEPARTMENT OF SOIL SCIENCE

1525 Observatory Drive
Madison, Wisconsin 53706
608-262-2633

August 17, 1979

Gene Wojcik, Chief
EIS Section
Environmental Engineering Branch
USEPA, Region V
230 Dearborn St.
Chicago, Illinois 60604

Dear Mr. Wojcik:

The EPA is to be commended for its fine job in preparing a comprehensive and thorough draft EIS for the Crystal Lake area proposed facility plan in Benzie County, Michigan. The EIS was quite effective in pointing out the possibly undesirable, secondary impacts of a sewer installation in the area. In recommending the limited action alternative, the EPA seems to be complying with Tanis' conclusion that "an alternative which addresses specific problem areas may be more appropriate" than complete sewering of the shoreline (Tanis, 1978). I wholeheartedly agree with this viewpoint. However, there is one point which has me slightly confused.

Consider these statements made in three recent publications dealing with Crystal Lake water quality: (R-1)

> "It is apparent that significant contributions of nutrients are made by Cold Creek discharges to Crystal Lake. Also it is apparent that the phosphates are being contributed by several business establishments and houses along the north branch." (Gannon, 1970)

> "Cold Creek watershed is an area of high influence on water quality....The greatest contributions of phosphorus to Cold Creek originate from the village of Beulah and its vicinity....

> Consideration should be given to alternative collection and routing of Beulah stormwater." (Tanis, 1978)

> "Impact analysis has indicated that non-point source runoff contributes a large percentage of the total Crystal Lake nutrient load....The two major nonpoint sources have been identified as the lower Cold Creek watershed and the lake bluffs....Alternatives to the current practice of routing Beulah's stormwater to Cold Creek should be investigated." (EPA, 1979)

It seems quite evident that Cold Creek contributes significant quantities of phosphorus to Crystal Lake. Indeed, by EPA's own estimate, 38.8% of the total phosphorus load to Crystal Lake originates in the Cold Creek watershed, while a maximum of 6.7% is contributed by septic tank seepage fields (EPA, 1979). Data presented by Tanis (1978) shows that about 68% of the phosphorus loading from Cold Creek occurs during the months of March and April. Taken together these figures would seem to indicate that a substantial portion of the total amount of phosphorus entering Crystal Lake (26%) is brought in by runoff from the lower Cold Creek watershed during periods of both high rainfall and snowmelt. This amount of incoming phosphorus exceeds by 400% the amount of phosphorus contributed by septic tanks. EPA is recommending that 7.4 million dollars be spent, in part, to eliminate septic tank inputs. What about Cold Creek?

Admittedly, it would be impossible to effectively eliminate all phosphorus inputs from Cold Creek. Any such suggestion would be unrealistic. However, Tanis (1978) showed extremely high phosphorus concentrations in Beulah stormwater runoff samples and the EPA itself has recognized the importance

of Beulah stormwater. Here, then, is the point of confusion.

EPA seems to be interested in preserving the water quality of Crystal Lake. It suggests that it's recommendation of specific action on the water quality problem "is justified to maintain (Crystal Lake's) unique scenic and recreational value" (EPA, 1979). Why, then, do none of the alternatives considered in the EIS address the possibility of rerouting Beulah stormwater? It seems that any solution which attempts to alleviate one problem while ignoring a much greater one is no solution at all.

As a graduate student in both soil chemistry and civil engineering, and as a summer resident of the Crystal Lake area I have both professional and personal interest in maintaining the water quality of this most beautiful lake. I ask that in the preparation of the final EIS the possibility of rerouting Beulah stormwater be given more consideration than just passing comment. If the EPA feels that 6.7% or less of the total phosphorus load warrants an expenditure of 7.4 million dollars, than it seems to me that what could be a substantially larger percentage ought not to go unattended. Even if no final action to eliminate Beulah's contribution is recommended, it's consideration as an alternative in the EIS would at least call attention to a problem that is not well recognized by Crystal Lake area residents.

Thank you very much for allowing me to express my opinion of the draft EIS.

Sincerely yours,

A. James Pastene
Research Assistant

Literature Cited

EPA. 1979. Draft Environmental Impact Statement. Alternative waste treatment systems for rural lake projects. Case study number one, Crystal Lake Area Sewage Disposal Authority, Benzie County, Michigan. June, 1979.

Gannon, J. J. 1970. Crystal Lake water quality investigation. Contract No. 33304-1-F. School of Public Health, University of Michigan, Ann Arbor, Michigan.

Tanis, F. J. 1978. Final summary report on Crystal Lake water quality study for the Crystal Lake Property Owners Association. Ann Arbor, Michigan.

August 20, 1979

Mr. Alfred Krause, Project Manager
Environmental Engineering Branch
U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, IL 60609

Re: Draft Environmental Impact Statement - Alternative Treatment Systems for Rural Lake Projects, Case Study No. 1., Crystal Lake Area Sewage Disposal Authority, Benzie County, Michigan

Dear Mr. Krause:

Since I was unable to attend the public hearing on the draft EIS on August 6, 1979 I would like to make the following general and specific comments.

General Comments

The great amount of data gathered during the case study support the conclusion that the Facility Plan Proposed Action is neither economically or environmentally justified. While the alternatives including the recommended limited action alternative are less expensive none are anticipated to have a positive effect on the water quality of the main body of Crystal Lake. The positive effects on shoreline Cladophora growths are questionable. The EIS in this regard fails to recommend or address explicitly lake management actions which are considered necessary to maintain or improve the long term water quality.

While the adverse effects of non-point sources (NPS) on lake water quality are discussed within the EIS they are considered secondary to the principal focus of the EIS which is to evaluate the impacts of the Facility Plan Proposed Action. Since NPS pollution is central to the water quality problem I suggest a complete discussion of NPS with recommendations be included in the EIS summary and recommendation sections.

Specific Comments

Refs. Kerfoot, W. 1978. Investigation of septic leachate discharge into Crystal Lake, Michigan.

Tanis, F. 1978, Crystal Lake Water Quality Study (CLWQS).

1. The EIS value for annual contribution of total phosphorus from precipitation as quoted from the CLWQS (Tanis, 1978) is for a specific year and is estimated to be 22% less than the long term average base upon the annual precipitation.

2. The hydraulic retention time of 63.1 years as reported in the EIS is misquoted from the CLWQS where the retention time was estimated to be 30.2 years.

3. The annual total phosphorus loading from Cold Creek is reported in the EIS (page 60) to be 679 kg/yr. This estimate is reported to have been made based upon data reported in the CLWQS report. I suspect this value was obtained by integrating under the loading-time curve and is approximately twice the sum of monthly averages as reported by the CLWQS. The integration technique would yield erroneous values of monthly loading during March and April of 1977 when very high levels of total phosphorus were observed in Cold Creek.

4. The EIS suggests on page 74 that a large discrepancy exists between the number of cottage sites found with Cladophora growth during the CLWQS survey (5%) and that indicated by the sanitary survey (34%). The former figure represents percentage of the 1090 cottages around the lake which showed significant growths. The sanitary survey's figure is given with respect to the 511 cottage which are located within 300 feet of the shoreline. Only 10% (approximately 5% of 1090) of these were found to have heavy growths. Thus, I believe the studies to be in much closer agreement than indicated in the EIS.

5. The "septic snooper" device used by Kerfoot (1978) to observe septic tank leachate plumes provides complementary data to those collected in the Cladophora surveys. However, the use of these data to calculate annual nutrient loading from individual tanks (or shoreline sections) as indicated in the above report (page 30) are in doubt for the following reasons.

    a. Total phosphorus concentrations measured in these plumes was often within the expected variation of whole lake concentrations.

    b. The measurements were made in November after many of the seasonal residents had left the area.

    c. The movement of phosphorus in soils associated with leachfields is highly variable in time and depends heavily upon local rainfall/ runoff conditions.

    d. Littoral bottom materials are put in motion during frequent windy weather. These materials move along the shoreline allowing some of the plume phosphorus to mix with lake waters.

For these reasons I would expect Kerfoot's values to be much lower than actual loadings.

In general, I believe that EPA Region V EIS staff and WAPORA Inc. have done a good job in preparing the draft EIS.

Sincerely yours,

Fred J. Tanis
2370 Delaware Drive
Ann Arbor, MI 48103

W. J. BAUER CONSULTING ENGINEERS
20 NORTH WACKER DRIVE
CHICAGO, ILLINOIS 60606
312 - 372-6436

July 18, 1979

Mr. A. Krause
Region V, US EPA
Water Division
230 S. Dearborn
Chicago, IL 60604

Subject: Crystal Lake, Frankfort, Michigan

Dear Mr. Krause:

I thank you for sending to me a copy of the EIS and a copy of its appendix concerning the subject area.

I have been on vacation at Crystal Lake, continuing a custom in our family that began in 1955, and have not as yet read these volumes in detail. However, I have skimmed through them and read the summaries, so I am able to comment as follows in this letter.

1. I applaud the decision to continue the use of septic tanks for the cottages around Crystal Lake. I agree with the report that the installation of sewers would not only be exhorbitantly costly, but would actually cause a deterioration of the environmental quality around Crystal Lake. Not only would nutrients now trapped in the soils be conveyed to and discharged into Betsie Lake and thence into Lake Michigan, but the presence of sewers would produce an intensification of pressures for a much increased population around the shoreline of Crystal Lake. I like it the way it is, with as much natural terrain remaining undisturbed as possible. The majority of lake residents and summer users also feel the same way.

2. I am still alarmed by the high costs of treating sewage for the little town of Frankfort. I realize that the costs have been much reduced as compared to the former proposals by the consulting engineer for the Facilities Plan, but I think there is still room for substantial cost cutting. The flows are so tiny; one wonders why such expensive facilities are required. I must admit that I have not examined any cost estimates in detail; I don't recall there even being any detailed cost estimates in the materials furnished to me; but the $7 million for such flows just appears too much.

3. I saw no discussion of any remedial measures for either Crystal Lake or Betsie Lake such as would result from a bottom cleaning operation. One can envisage equipment similar to that used for cleaning swimming pools,

but of course with substantial design changes to account for the presence of unconsolidated materials on the bottom and the much larger size required; such equipment might be used to reduce the present accumulations of undesirable materials, and to export nutrients now on the bottoms of these lakes - particularly on the bottom of Betsie Lake - to the nearby agricultural areas which could benefit from them. This approach could probably remove nutrients from the lake for substantially less per pound than the cost of reducing the input of them via the proposed Frankfort sewage treatment system.

4. Again, I suggest an open competition for the handling of the Frankfort sewage. Why could not the specifications read as follows:

   a. The cities of Frankfort and Elberta, Michigan invite the submittal of proposals to design, construct and operate a facility for handling an average of X million gallons per day of sewage, with peak flows of Y million gallons per day, to be treated to the required state standards which include limits on B.O.D., S.S., and nutrients. The proposal will be accompanied by a fixed price for construction; a fixed price for operation, with escalation clause to allow for future increases in costs of energy and labor, and a suitable performance bond covering the entire scope of the work.

   b. The detailed specifications of the methods to be used in evaluating performance are given in the attached specifications.

   c. The work is partially funded by grants from the federal and state governments, and the applicable regulations regarding the qualifications of persons to be employed by the successful bidder in the execution of this work must be obeyed.

If the contractor did not provide plans and specifications suitable for the accommodation of the sewage, then one need not award a contract to him. On the other hand, if you would advertise in the manner described above, I would organize a bid, which would include providing of the land to be irrigated with the wastewater, as well as the land for the storage and treatment lagoon.

5. You could even arrange to have the job bid both ways at the same time. Let conventional plans for the bio-disc plan be drawn up. Then advertise for proposals for the construction of that plan and also for proposals for the design, construction and operation of a plant to be proposed by the bidder. Then one could take a choice at the time of the consideration of bids. You would throw out the proposals that your technical committee would evaluate as being incapable of meeting the required performance and then choose among those that would remain.

6. In summary, I was pleased to see that progress has been made, that the profligate and dangerous plan proposed by the consultants has been shown to be undesirable and that your agency has the courage to take an opposing view. I shall try to attend the August 6th meeting at Frankfort High School, which is on a Monday evening. I normally would be at Crystal Lake on a Monday evening.

Very truly yours,

William J. Bauer

WJB/jp

August 25, 1979

Mr. Alfred Krause, Project Monitor
U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, IL 60609

Subject: Draft of Environmental Impact Statement - Crystal Lake Area Benzie County, Michigan

Dear Mr. Krause:

As spokesmen for the three lake associations comprised of property owners in the Crystal Lake area, we would like to submit the following commentary concerning the Draft E.I.S. for our area.

We generally agree with the conclusions of the Draft E.I.S., and support the Limited Action Alternative. In addition, we are impressed with the preparation and thoroughness of the document.

However, we are concerned that the Draft E.I.S. does not address a major source of nutrient input to Crystal Lake, namely Cold Creek.

Also, we were startled to learn that the project was in effect already segmented and different priorities assigned. This aspect leaves us fearful that our specific interests may be stalled again!

Again, an additional concern is the likliHood that the National Park Service will install a roadway on the bluff areas between Beulah Village and Warren Road. The resultant erosion potential for impact on the lake would seem to be of serious concern in the Study Area.

Consideration of these concerns in the final draft should result in additional protection of the water quality of Crystal Lake - our major concern.

Respectfully,

Ralph C. Hand
C.L.P.O. President (350 members)

William B. Krebs
North Shore Association Pres.
(150 members)

Thomas W. Williams
South Shore Association - Pres. (228 Members)

Northwest Michigan

Regional Planning and Development Commission

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TRAVERSE CITY, MICHIGAN 49684

RECEIVED NOV 14 PM 12:19 '79 WATER DIVISION

9 November 1979

Mr. Alfred Krause
U.S. EPA
230 S. Dearborn
Chicago, ILL 60604

Dear Mr. Krause:

The Northwest Michigan Regional Planning and Development Commission at its 19 October 1979 meeting concurred in the recommendations in the Crystal Lake Environmental Impact Statement. The Commission believes that you have provided important information for dealing not only with Crystal Lake's water quality problems, but also with similar existing or potential problems elsewhere in our Region.

Although the report is generally satisfactory we would like to reinforce comments made by the Crystal Lake Property Owners Association regarding Cold Creek. Cold Creek is a major nutrient source, and we feel that the EIS should therefore investigate that problem in greater detail. The survey of effluent discharges to Cold Creek to detect leakage from Beulah sewers is an important study and definitely should be conducted. In the event that the Beulah sewers are found not to be causing the high phosphorus loading, then the Environmental Impact Statement should outline other studies that EPA will perform to identify the problem. The addition of this material to the Environmental Impact Statement is very important.

The Commission applauds the Environmental Protection Agency for its efforts to date, and urges it to follow through with implementation of the Environmental Impact Statement recommendations.

Sincerely,

Robert C. Morris AIP
Executive Director

/gs

cc: Bruce Moore, Michigan Dept. of Nat. Res.
Bruce Orttenburger, Benzie County Planning Director
Bill Crawford, Benzie County Health Department
Ralph Hand, Crystal Lake Property Owners Association

807 Forest,
Frankfort, Michigan 49635,
July 26, 1 9 7 9.

Mr. Alfred Krause, Project Monitor,
230 South Dearborn St.,
Chicago, Illinois.

Subject: Draft Environmental Impact Statement, Crystal Lake Facility Planning Area, Crystal Lake, Michigan.

Dear Mr. Krause,

I recommend that EIS Alternative 4 (page viii) be implemented. (As stated "Same as EIS Alternative 3, except that land application of waste water would be substituted for RBC treatment).

My reason for this recommendation is that water quality of Betsie Lake should be the best possible without adding some effluent resulting from RBC treatment. Betsie Lake water is prime recreational water so the quality should be the best possible.

On another subject, in Volume II Appendices, page Appendix G-2 there appears a list of endangered plans; also referred to Vol. I, part II, D-4, page 83. Indicated as perhaps not being involved, the enclosed news item from the Traverse City Record-Eagle may be of interest.

Sincerely yours,

Arvid Tesaker

Great Lakes Basin Commission

Lee Botts, Chairman

3475 Plymouth Road
Post Office Box 999
Ann Arbor, Michigan 48106
313/668-2300 FTS: 378:2300

July 17, 1979

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

RE: Draft EIS, Alternative Waste Treatment Systems for Rural Lake Projects, Case Study Number 1 Crystal Lake Area Sewage Disposal Authority, Benzie County, Michigan

Dear ~~Mr. Wojcik:~~ Gene

Thank you for the opportunity to review the draft environmental impact statement for the Crystal Lake Sewage Disposal Authority Sec. 201 project. My staff has reviewed the EIS and found it to be well written.

I was particularly impressed with the initiative taken to develop an innovative and cost-effective solution to the water quality problems described in the report. The analysis clearly demonstrates the potential for substantial cost savings while still meeting local and national water quality needs. Also important, as the report points out, are the possible development impacts if extended sewage collection and treatment is provided.

Our analysis of regional water quality management plans throughout the Great Lakes basin, prepared as a part of our Great Lakes Basin Plan, has shown consistent support for the small waste flow district approach in sparsely settled areas. I hope that the analysis done for this report serves as a model for similar projects throughout the country. In particular, I recommend that the report be made available to "208" agencies, if this has not already been accomplished.

Yours truly,

Lee

Lee Botts
Chairman

Good job

cc: John McGuire
Madonna McGrath
William Marks

DRAFT ENVIRONMENTAL IMPACT STATEMENT

ALTERNATIVE WASTE TREATMENT SYSTEMS FOR RURAL LAKE PROJECTS

Case Study Number 1

Crystal Lake Area

Sewage Disposal Authority

Benzie County, Michigan

Statement by

Dr. Stacy L. Daniels

999 Crystal Drive

Public Hearing

Frankfort, Michigan

August 6, 1979

I am Dr. Stacy L. Daniels, a resident of Crystal Lake at 999 Crystal Drive, and a native of Frankfort and Benzie County. I have been particularly interested in following the development of the draft Environmental Impact Statement for the Crystal Lake Area. As a practicing environmental engineer, I am familiar with the EPA study procedures. I have been involved personally in the development of technology for the removal of phosphorus from wastewater by chemical means. I also participated in the 1978 Water Quality Study for the Crystal Lake Property Owners Association.

I generally agree with the conclusions reached in the draft EIS. It is heartening to see a study in which the conclusions are supported by scientific fact. I support the Limited Action Alternative. I do not believe that any of the alternatives would improve the water quality of the main body of Crystal Lake. I do not believe that extensive sewering is warrented. I encourage the EPA to continue monitoring of both ground and surface waters, and analysis of existing on-site treatment systems. I believe this approach will be supported by the property owners to preserve the present character of the community.

I would like to address two specific points: (1) the impact of a ban on phosphorus-containing household detergents, and (2) the application of innovative technology for on-lot systems.

I disagree with the conclusion in the draft EIS regarding the reduction of phosphorus (Chapter III.1.b, pp 101-3). I do not support the action of the Michigan DNR which banned the statewide use and sale of domestic laundry detergents containing more than 0.5% phosphorus. I contend that there will

be no significant reduction of the capital or operating costs of phosphorus removal by the sewered communities of Frankfort/Elberta. The impact of the ban on the unsewered community of Crystal Lake will be insignificant and at best will amount to a reduction of the total phosphorus load to Crystal Lake of about 2% (6.7% total phosphorus load from septic tanks x 0.35 reduction) (Table II-6, p 60, and Chapter IV.A.1.a-b, pp 145-54). The option of a ban on phosphorus is not viable (p 98) and should be deleted. I agree, however, that the phosphorus ban will not achieve the effluent discharge limit of 1 mg/L set for Betsie Lake. This will require chemical treatment (coagulant and flocculant) at the new Frankfort/Elberta plant. I encourage the revision of the draft EIS to reflect these views.

With regard to the continued use of on-lot systems, I support a program of replacement and rehabilitation of malfunctioning systems to comply with local health codes (Chapter III.C.2.f, pp 127-30). The management of small waste flow districts is correctly addressed in the draft EIS (Chapter III.D.2, pp 140-4). The cost sharing eligibility for small waste flow systems using innovative or alternative technologies is further encouraged (Appendix J-3) by a 15% present worth preference over conventional technologies. The EPA is presently addressing the questions of elgibility for those systems which do not have existing problems, those owned publically or privately, and those operated seasonally or permanently. I believe that development of innovative technology, such as waterless toilets (p 107) should be encouraged as an option for all on-site systems regardless of ownership or period of use.

In conclusion, I believe that the EPA Region V personnel and their contractors and subcontractors should be commended for a very credible job in preparing what should be a model EIS for Alternative Treatment Systems for Rural Lake Projects

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230
(202) 377-4335

August 15, 1979

Mr. Charles H. Sutfin
Director, Water Division
U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Sutfin:

This is in reference to your draft environmental impact statement entitled, "Crystal Lake Facility Planning Area, Crystal Lake, Michigan." We have the following comments to offer.

Appendix B, National Ambient Air Quality Standards. This Appendix should be updated to include the revised primary and secondary standards for ozone (formerly photochemical oxidants, 44 Fed. Reg. pages 8202 thru 8237, dated February 8, 1979), and for lead (43 Fed. Reg. 46246, October 5, 1978).

Enclosed are comments prepared by the National Oceanic and Atmospheric Administration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving eight (8) copies of the final environmental impact statement.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosure

Memo from: Mr. Eugene J. Aubert
Director, GLERL, RF24
Environmental Research
Laboratories

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL RESEARCH LABORATORIES

Great Lakes Environmental Research Laboratory
2300 Washtenaw Avenue
Ann Arbor, MI 48104

August 3, 1979

TO: Richard L. Lehman, Acting Director
Office of Ecology and Conservation, EC

FROM: Eugene J. Aubert
Director, GLERL, RF24

SUBJECT: DEIS 7907.07 - Alternative Waste Treatment Systems for Rural Lake Projects; Case Study Number 1 - Crystal Lake Area - Sewage Disposal Authority; Benzie County, Michigan

The subject DEIS prepared jointly by U.S. EPA and WAPORA, Inc. on Crystal Lake area sewage disposal has been reviewed and comments herewith submitted.

Crystal Lake area near eastern shoreline of Lake Michigan is a well-established recreational center based upon diversified scenic and sports amenities. To maintain these unique values a plan was prepared for an extensive wastewater collection and treatment. Costs of the plan, Facility Plan, would be extremely high, $8,654 per existing dwelling. For this reason an examination was conducted of less extensive plans. The least cost plan, Limited Action, was selected as the Recommended Plan. It would provide construction of new sewers and a rotating biological contactor treatment plant to serve Frankfort and Elberta and cluster systems or other off-site treatment for the northeast and southeast Crystal Lake shorelines. Cost estimate of the Limited Action Plan assumes that cluster systems will be required for these shorelines (page 125).

The assumption is contrary to findings of the on-site surveys conducted in 1978 by Biological Station, University of Michigan, and by K-V Associates Inc. Biological Station found that northeast section is the problem area and individual septic system improvements or cluster systems would not be possible in the immediate area due to high seasonal groundwater, but would require pumping to suitable soils away from the lake. It concluded that sewering and land application appear to be the most effective, lower cost, alternative (Appendix F-1, page 15). Surveys by K-V Associates indicated that an abrupt cessation of wastewater plumes into Crystal Lake occurred when sewered area of Beulah was encountered on the east shore (Appendix C, page 13).

In view of findings of the on-site surveys, it is suggested that the recommended Limited Action plan be modified to include central sewer system for the northeast section. It appears that the second lowest cost plan, Alternative 6, with proposed gravity sewer collection would eliminate extensive algal growth along the northeast shoreline and provide many other benefits. This Alternative could serve as a basis for a Recommended Plan.

REV. GILBERT APPELHOF, JR.
6084 Crystal Drive
Beulah, Mich. 49617

August 6, 1979

U.S. Environmental Protection Agency
Region V, Chicago

Attention: Charles F. Sutfin
Director, Water Division

Dear Sir:

We are year-around residents of Benzonia Township, living on the north shore of Crystal Lake. We own two houses, one on the lake shore, one on the bluff, located between Nichols Road and Warren Road.

We have special interest in the "cluster system" proposed by your organization, and hope it will extend to include our area. If so, we pledge our fullest cooperation in bringing this about.

We appreciate your comprehensive studies which have been recorded in your "Environmental Impact Statement," published recently. You have done a commendable job, and a most difficult one!

Very sincerely,

Rev. Gilbert Appelhof, Jr.
Hilda Appelhof

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

July 31, 1979

Mr. Alfred Krause
Project Monitor
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60609

Dear Mr. Krause:

The draft environmental statement for the Crystal Lake Area Sewage Disposal Authority, Benzie County, Michigan has been reviewed. We find the proposed improvement will have no adverse effect on the Federal-aid routes in the area.

No reference to the consistency of the proposed improvement to Michigan's Coastal Zone Management Plan could be found in the statement. This should be discussed in the final statement.

Sincerely yours,

Donald E. Trull
Regional Administrator

By: Jerry F. Poston
FOR W. G. Emrich, Director
Office of Environment and Design

Appendices

Appendix A

Aerial Septic System Survey of Crystal Lake

AERIAL SEPTIC SYSTEM SURVEY OF CRYSTAL LAKE

Introduction

An aerial photographic survey was conducted by EPA's Environmental Photographic Interpretation Center (EPIC) to locate failing septic systems throughout the Study Area. There are three basic types of failures that can occur with septic tank or cesspool systems: 1) the wastewater contained in the system backs up into the home, 2) the wastewater "short-circuits" to underlying groundwater before it is adequately filtered and purified, and 3) the wastewater makes its way to the surface in the form of a surface "break-out". It is this last type of failure that is detectable using aerial photographic techniques.

Based upon work undertaken to date, it has been demonstrated that the primary surface manifestations associated with this type of failure are: 1) conspicuously lush vegetation, 2) dead vegetation (specifically grass), 3) standing wastewater or seepage, and 4) dark soil where excess organic matter has accumulated. All of the above are a result of the upward movement of partially treated or untreated wastewater to the soil surface, and usually appear directly above or adjacent to one or more components of the septic system. Often, two or more of these manifestations will occur simultaneously at a homesite experiencing a septic system failure.

Methodology and Results

The two types of aerial film used in the survey of the Crystal Lake study area include normal color (KODAK 2448) and color infrared (KODAK 2443) acquired in the summer of 1978 at a scale of 1:8000, or 1 inch = 667 feet. In the photo interpretation procedure, this aerial film was viewed simultaneously in a "multispectral" approach to identify those manifestations associated with malfunctioning septic systems (i.e., lush vegetation, dead vegetation, standing wastewater or seepage, and very dark soil), and distinguish them from unrelated surface phenomena. These "signatures" were used in conjunction with a knowledge of what type of system might be used with homes of various ages and styles, and knowing where they should be situated in relation to the house, to devise a "photo interpretation key" for detecting and locating failing septic systems. After the photo analysis was completed for the area, an extensive field inspection was undertaken by personnel from EPIC and WAPORA to verify actual failures and discriminate them from "false" signatures.

Using the photo interpretation key, 100 potentially failing septic systems were identified and located on the aerial photography. Upon field inspection, 29 systems were evaluated as being "overt" or "marginal" failures. Those systems designated as overt failures were having problems with wastewater coming to the surface during the time of the ground inspection. Those systems designated as marginal were not necessarily failing at the time of the inspection, but did exhibit signs of having failed in the past, or having the potential for malfunctioning during periods of excessive use or moderate to heavy rainfall. In the majority of cases, the "false" signatures were areas of ponded rainwater, drainage from roof gutters, low-lying shrubs, and other areas of excess soil moisture and lush vegetation not related to failing septic systems.

Conclusions

One of the significant findings of the aerial survey, and subsequent field inspection, was that despite the excess number of "suspect" sites initially located, most of the chronic surface failures in the study area were believed to have been identified and located. What is important here is not the percentage of probable failures actually confirmed, but whether most of the significant failures have been located. For example, if there are 25 actual failures in an area with 2,500 homes, it is more important to find all 25 failures within a group of 90 "suspect" sites than to find only 16 out of 20. The "detection" percentage is higher in the latter instance, but in the first instance all of the failures have been found, and in both instances the number of homesites requiring field inspection have been greatly reduced, and objective information on the number and location of surface failures within a specified area has been obtained.

Because of the difficulties experienced in detecting failures in sandy soils and under vegetation canopies, it is possible that some surface break-outs may not have been detected. As mentioned previously, however, this possibility was not supported by findings of the field inspection. Thus, it is believed that a thorough and accurate septic system failure survey was accomplished in the Crystal Lake study area.

Appendix B

Cost Information

- No Action Alternative - Crystal Lake Area Project
- Limited Action Alternative - Crystal Lake Area Project
- Limited Action Alternative - Frankfort and Elberta Project
- Work Description and Cost Estimate - Site Specific Analysis
- Operation and Maintenance Cost Estimate - Limited Action Alternative - Crystal Lake

Note: All costs in $1000.

No Action Alternative - Unsewered Areas of Crystal Lake Study Area

Assumptions:

- 1385 dwellings unsewered in 1980
- Increase 1980 - 2000 (years) = 809 (standard systems)
- 2% per year failure rate for existing dwellings with half going to holding tank without flow reduction and half going to dosed mounds.
- Septic tank pumping on average of 1 per 10 years. $45/pump of 1000 gal.
- Sanitarian salary = $18,000/year. 12 hour per new permit. 16 hours per failure

Annual costs - constant

- Install 14 holding tanks at $1714 each = $23,996
- Install 14 mounds at $4115 each = 57,610
- 20 new permits x 12 hr./permit x $8.65/hour = 2,076
- 28 failures x 16 hr./failure x $8.65/hour = 3,875
- 40 new ST/SAS x $1365 = 54,600
- 140 septic tank pump x $45 = 6,300

Annual costs - increasing

- Holding tank pump = $400/year for seasonal residents, 4 months/year x 2 pumps/month of 3000 gal. each x $50/pump. 14 new tanks/year x 400 = 5,600
- Dosing systems for mounds $50/year each x 14= 700

No Action Alternative - Crystal Lake Area

Present Worth Analysis

	Capital	Constant O & M	Increasing O & M	Salvage Value	Total
Annual Costs - Constant	1457.0	131.0		-259.8	1328.2
Annual Costs - Increasing			495.5		495.5
					1823.7

Limited Action Alternative - Crystal Lake Area Project

Summary Cost Data

Unit (year of construction)	Capital Cost	Constant O & M Cost	Increasing O & M	Salvage Value
Site Specific Analysis (1980)	501.7			
6 cluster systems (1980)	418.1			36.7
Land for cluster systems (1980)	60.0			108.4
On-site system upgrading (1980)	867.0			111.1
Contingency and Legal (1980)	90.0			
Future on-site systems (40.5 new systems/year)	93.8/year			1,002.7
Management, Operation and Maintenance (continuous)		113.5	2.3	

Limited Action Alternative - Crystal Lake Area Project

Present Worth Analysis

	Present Worth of				
	Capital	Constant O & M	Increasing O & M	Salvage Value	Total
1980 Construction and Analysis	1936.8			- 67.8	1869.0
Management, Operation and Maintenance		1214.2	+ 184.8		1399.0
Future On-site Systems	1003.4			-265.2	738.2
					4006.2

Local Cost Analysis (1980)

		per Household
Total Capital Costs	$1,936,800	
Eligible Capital Costs	1,936,800	
Local Share of Capital (10%)	193,680	
Annual O & M	113,500	$ 82
Debt Service/year	15,413	11
20% Capital Reserve	3,083	2
		$ 95

Limited Action Alternative - Frankfort and Elberta Project

Summary Cost Data

Unit (year of construction)	Capital Cost	Constant O & M Cost	Increasing O & M	Salvage Value
.33 mgd rotating biological disc treatment plant (1980)	1744.8	64.0/yr.	.68	676.0
Interceptor sewers to new treatment plant (1980)	104.4	1.4/yr.		57.8
Frankfort and Elberta sewer rehabilitation (1980)	263.9			
Frankfort storm sewer separation (1980)	204.6			
1980 Engineering and contingencies	579.4			
Future sewers for Frankfort and Elberta (1990)	860.8	2.1/yr.		530.8
1990 Engineering and contingencies	215.2			

Limited Action Alternative - Frankfort and Elberta Project

Present Worth Analysis

	Capital		Present Worth of Constant O & M	Increasing O & M	Salvage	Total Present Worth
1980 Construction	2897.1	+	703.9	53.5	-194.1	3460.4
1990 Construction	553.4	+	7.6		-140.4	420.6
						3881.0

Local Cost Analysis (1980)

		per Household
Total Capital Costs	$2,897,130	
Eligible Capital Costs	2,897,130*	
Local share of capital (20%)	597,426	
Annual O & M	65,400	$ 54
Debt service/year	46,111	38
20% Capital reserve	9,222	8
		$100

* Some costs associated with the project will be ineligible as discussed in the Facilities Plan. For the purposes of this analysis, the amount was assumed to be negligible.

Work Description and Cost Estimate
Site Specific Analysis
Crystal Lake, Michigan

Assumptions:		
	# dwellings	= 1384 total, 500 lakeside
	Surface Malfunction	= 3% based on U. Mich. sanitary survey
	Repeat Backups	= 6% based on U. Mich. sanitary survey
	Non-Conformance	= 53% total
		= 23% less than 50' to well
		= 63% small septic tanks or no record
		= 57% small drainfield or no record

Step

1. Sanitary Survey - Each survey house to include: completion of questionnaire, inspect site, inspect well, explain access requirements, provide access papers, educate, coordinate with survey team on decision for succeeding steps.

-5/person/day	= 1384 homes, 277 days	
-Personnel:	Sanitarian	25
	Sr. Engineer	25
	Soil Scientist	14
	Jr. Engineer	25
	Surveyors	174
	W. Q. Scient.	14

2. Well Sampling - For homes with private wells less than 50 feet from sewage facilities or down-gradient, collect sample for analysis of fecal coliform bacteria, nitrates and bacteria.

-10/person/day	40% based on 23% less than 50' from and an increment for down-gradient = 55 days	
-Personnel:	Surveyors	47 days
	W. Q. Scient.	8

3. Septic Tank Inspection - For septic tanks a) for which no records or memory of size, construction exist, b) for systems which have reported backups c) for systems which have surfaced in past d) for tanks reported to be small. Locate, uncover, pump, and inspect for construction, leaks, deterioration, condition and type of sanitary tees and baffles. Rod influent line noting roots, other obstructions or collapse. Rod effluent line noting same plus distance to headers, distribution box, bends, obstructions.

-70% of 1384, 6/day/person plus $450/day for 3 man crew and rodding equipment and pump truck plus $20/tank waste disposal fee		
-Personnel:	Jr. Engineer	161 days

4. Soil Sampling - For lots with a) past or present malfunctions not explained by survey results or septic tank inspection, b) substandard soil disposal units, c) no record for soil disposal unit. Determine soil texture, color, depth to seasonal high groundwater level, water table of time of sampling in suspected area of soil disposal unit and in alternate sites on and

near lot. Probe suspected area of soil disposal unit for depth, size, type.
-60% of 1384, 4/day/2 persons. 415 days
- Personnel: Soil Scient. 215
Surveyor 200

5. Header and Drainfield

Excavation: For systems having recurrent backups or past surface malfunctions not explained in prior steps, hand excavate effluent line from point of obstruction, headers, etc. to uncover distribution system. Hand excavate test pits to verify size, depth and type of subsurface disposal unit. Evaluate soil crusting, decomposition or silting in of aggregate, poor distribution, soil hydraulics as reasons for failure.
-10% of 1384, 3/day/supervisor, 1/day/2 persons. 322 days
- Personnel: Sanitarian 46 days
Laborers 276

6. Well Water Meter

Installation: For on-site systems with limited hydraulic capacity as determined by sanitary survey, soil sampling or excavation, install water meter (after outside faucet) and read at least monthly during survey .
-(1384 x .2) x 6 inspections - 24/person/day = 70 days
plus $175 for meter and meter installation
- Personnel: Surveyor 70 days

7. Shallow Groundwater

Sampling: Shoreline scan with fluorescent meter to detect emergent plumes. Follow-up at sites with plumes with shoreline transect and 5 samples per plume for bacterial and nutrient analysis.
-Scan: 10 days x 2 persons = 20 days
Transects: 100 plumes ÷ 2 plumes/day x 2 persons/day = 100 days
Plus $20/sample for analysis at Frankfort STP
- Personnel: W. Q. Scient. 60 days
Sanitarian 30
Surveyor 30

8. Supervision/Documentation/Clerical

Support: Assume 272 work days total. Sanitarian at 100%, including Tasks 1, 5, and 7. Sr. Egnineer at 25% plus 20 days for report. Secretary at 100%.

LABOR SUMMARY

	1	2	3	4	5	6	7	8	TOTAL
SURVEYORS									
Sanitarian	25				46		30	171	272
Sr. Engineer	25							63	88
Jr. Engineer	25		161						186
Soil Scient.	14			215					229
W.Q. Scient.	14	8					60		82
Surveyors	174	47		200		70	30		521
Laborers					276				276
Secretary								272	272
	277	55	161	415	322	70	120	461	1,926

DPW COSTS

Salaries	Sanitarian at $25,000/yr. for 272 days		$ 26,154
	Surveyors at $11,000/yr. for 521 days		22,042
	Laborers at $12,000/yr. for 276 days		12,738
	Secretary at $12,000/yr. for 272 days		12,554
			$ 73,488
	20% Fringe		14,698
		SUBTOTAL	$ 88,166
Rent	Office at $300/month x 13 months		3,900
Service Contracts	Well sample analysis by Frankfort STP $10 x 554		5,540
	Transect sample analysis by Frandfort STP $20 x 5 x 100 plumes		10,000
	Septic tank inspect. ($450 x 161) & ($20 x 969)		91,830
	Water meter installation ($175 x 277)		48,475
Equipment & Sampling	Fluorescent meter		14,000
	Groundwater flow meter		4,000
	Field sampling equipment		2,000
	Paper supplies		2,000
	Cameras & film for documentation/records		3,000
	4 vans at $350 & $120 gas & oil/month x 13		24,440
Summary	Salaries		88,166
	Rent		3,900
	Contracts		155,845
	Equipment and supplies		49,440
			297,351

CONSULTANT COSTS

Direct Labor	Sr. Engineer at $35,000/yr, 88 days	11,846
	Jr. Engineer at $20,000/yr, 186 days	14,308
	Soil Scient. at $25,000/yr, 229days	22,019
	W.Q. Scient. at $25,000/yr, 82 days	7,885
		$56,058

Other Direct Costs	Report reproduction		$ 150
	Communication		1,000
	Graphics, report prep.		1,500
			2,650
Travel	House rental for office, sleeping (13 mos.)		6,500
	Other per diem $20/day x 790		14,000
	75 RT - 700 miles x .20/mile		7,000
			27,500
Consultant Costs	Labor x 3.0	56,058 x 3	168,174
	ODC x 1.2	2,650 x 1.2	3,180
	Travel x 1.2	27,500 x 1.2	33,000
			204,354

TOTAL

DPW	297,351
Consultant	204,354
	501,705

Equivalent to $363 per house total, $36.50 per house local share after Federal and state grants.

Operation and Maintenance Cost Estimate
Limited Action Alternative
Crystal Lake, Michigan

Assumptions:

1) Properly trained sanitarian will provide administration, engineering, operations and planning services. Salary $25,000/year. Time not spent on routine duties will be used for special monitoring studies and evaluation of innovative systems, management techniques and public education.

2) User charge and secretarial services provided by half-time secretary at $6,00/year.

3) Soil scientist available on retainer for 20 days/year at $325/day.

4) Well sampling and site inspection provided by part time surveyors, 2/year at $3,000 @ for 12 weeks in summer.

5) 20% fringe benefits for sanitarian, secretary and maintenance personnel.

6) Septic tanks serving permanent residences will be pumped every 3 years, seasonal every 5 years. Assume 50% permanent.

7) Septic tank pumping by 2 men making $7.50/hour each, 2 hours/ 1000 gallon septic tank. $20/hour for truck. $15/1000 gallons for septage treatment.

8) O & M for dosing systems and mounds = $50/year each. For electricity, pump removal for seasonal residents, and emergency maintenance by contract.

9) O & M for cluster systems = $100/year each. Includes electricity, monthly inspection by sanitarian, periodic and emergency maintenance by contract.

10) H_2O_2 treatment at 2%/year, $400/treatment.

11) Each private well sampled every 5 years.

12) Water sample analysis provided by Frankfort-Elberta for $10 for nitrate and fecal coliform (well water) and $20 for nutrient series. Nutrient series limited to 200 samples per year for compliance testing of near-shore systems. Lake and stream sampling not included.

Salaries - constant

Sanitarian/Administrator	$25,000
1/2 time secretary, $12,000 ÷ 2	6,000
1400 hours for 2 men to pump 350 tanks per year at 2 hours each per tank; $7.50/hr.	10,500
2 part-time surveyors at $3,000/year	6,000
	$47,500
FRINGE	X 1.2
	$57,000/year

Salaries - increasing

Additional 200 tanks pumped each year by 2,000 or 10 more per year x 4 hrs. X $7.50/hr.	$ 300/yr.

Retainer - constant

Soil scientist at $325/day for 20 dyas/yr.	$ 6,500/yr.

O & M - constant

6 cluster systems at $100/yr. each	$ 600/yr.
H_2O_2 treatment for existing systems at 2% x 1384 & $400	11,000
Existing well sampling 1384 x .2/yr. x $10	2,800
Cluster system well sampling 6 cluster x 3 well/ cluster x 2 samples/yr. x $10/sample	360
Septic tank truck at $20/hr. x 700 hrs./yr.	14,000
200 water sample analysis/yr. for compliance testing x $20	4,000
Septage treatment for 350 tanks x $15/tank	5,250

O & M - future system

40 new homes/yr. 45% with pumps at $50/yr.	900/yr.
40 new homes/yr. 25% septic tank pump at $15 for treatment and $40 for truck	750/yr.
20% well samples at $10	80/yr.
2% H_2O_2 at $400	320/yr.

Rental - constant

Office at $300/month x 12	3,600
Office supplies, telephone, etc.	2,000
Van purchase, maintenance, gas & oil	6,000
Small boat and motor rental 4 wks/yr x $100/wk.	400

Summary

Constant:

Salaries	$57,000/yr.
Retainer	6,500
O & M	38,010
Rental	12,000
	$113,510/yr.

for 1384 homes = $82/house

Increasing:

Salaries	$ 300/year
O & M	2,050
	$ 2,350

in 20 yrs = $47,000 more per year
111,760 base
$158,760

for 2194 homes = $72.36/house

Appendix C

Fourteen Things You Can Do to Keep Crystal (or Betsie) Clear

UNITED STATES ENVIRONMENTA 'ROTECTION AGENCY | REGION V CONST CTION GRANTS PROGRAM
NO. 6 | DATE OF ISSUE September 12, 1978

E.I.S. NEWSLETTER

Fourteen Things You Can Do To Keep Crystal (or Betsie) Clear

Malfunctioning septic tanks, although they can sometimes be an important source of the nutrients that cause lake decay, are not the only source of such pollutants. All of the sewage treatment alternatives in the 1976 Facilities Plan and in the current EIS will affect only localized nutrient "hot spots", and not the long-term condition of the whole lake.

The Environmental Impact Statement will develop recommendations to deal with the localized problems, but long term improvement of water quality for the whole lake will require individual action by Crystal Lake area residents.

Individual action can help control "non-point sources" of phosphorus and nitrogen, such as lawn, farm, and orchard fertilization. Any substantial rainfall causes fertilizers, pesticides, and weedkiller to run off the land into the lakes. Taking the lakes as a whole, these "Non-point sources" are the major sources of nitrogen and phosphorus entering the two lakes.

Here, with the help of Gale F. Arent (one of Michigan's County extension directors) are fourteen things you can do in your own home to keep Crystal and Betsie Lakes clear:

1. Maintain a zone of natural vegetation between your lake and lawn. If you wish to plant a buffer strip, some trees worth considering are tamarack, red cedar, black willow, red oak, white oak, sugar maple, black ash and balsam poplar. A buffer strip can help stabilize the shoreline and prevent runoff. Deeply rooted plants can take up nutrients from the soil, instead of allowing them to seep into the lake water.

2. If you are planting a lawn, plant fescue rather than blue grass. The annual nitrogen requirement of fescue is about 2 lbs. per 1000 square feet, while bluegrass needs 4 to 7 lbs. per 1000 square feet.

3. Use the smallest possible amount (this may be none at all) of nitrogen fertilizer to maintain a good grass cover. Fertilize with nitrogen in the spring using a small amount of a soluble form of nitrogen. The principle is to have the grass use the nitrogen so it will remain vigorous and minimize the amount of undissolved fertilizer on the lawn surface capable of washing into the lake. If the lawn is not growing well, apply a small amount of nitrogen in early summer.

4. Do not use fertilizer containing phosphorus or potash unless a soil test indicates the need for these nutrients and the lawn is not growing well. In most case no phosphorus is needed on lawns.

5. Water sparingly, especially on sandy soils, to reduce the possibility of leaching nitrogen and other nutrients as the water moves through the soil toward the lake.

6. Avoid fertilizer-weedkiller mixtures. Use weedkillers only if weeds become a serious problem. If weeds are treated, apply the weed-killer in the fall. This will minimize runoff and reduce the chance of injury to trees and shrubs.

7. On lightly fertilized lawns thatch will probably not need to be raked. It will decompose and provide part of the nutrients needed by the lawn.

8. Rake leaves in the fall. This will keep them from "shading" the lawn and from falling into the water where they will add to the nutrient load.

9. Do not cut the lawn too close. Cutting height should be 2" to 2 1/2" so an adequate green area remains on the turf.

10. Don't park your car on the lawn.

11. Don't burn leaves in the gutter. Collect any leave that fall and use them for compost or mulch.

12. Dog droppings are high in phosphorus, so don't "Walk" your dog along the curb. If there is no large area where dog droppings won't be a nuisance, collect the droppings and bury them, compost them, or flush them down the toilet. Your neighbors and the lake will appreciate it.

13. Do not clean driveways and sidewalks by hosing the dirt into the street, but sweep it onto your lawn, or collect the dirt for disposal elsewhere.

14. Keep your gutters clean and, if possible, dispose of the water on your property so it can soak into the ground.

Appendix D

Soil Conservation Service

Soils Data

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

10850 Traverse Highway, Suite 1105, Traverse City, Michigan 49684

December 1, 1978

Mr. Dennis J. Sebian, PE
WAPORA, Inc.
6900 Wisconsin Avenue N.W.
Washington, D.C. 20015

Dear Mr. Sebian,

The enclosed table and soil interpretations are the results of the soils study made in the Crystal Lake area of Benzie County you requested for the EIS you are preparing on proposed waste water facilities.

The table lists the items you requested with the exception of phosphorus absorption capacity which is an interpretation we do not make. The investigations were made on the lots you designated on the location map as closely as possible. The predominant soil series and slope ranges are indicated in the outlying areas. Soil interpretation pages for each soil series indicated are enclosed.

The water level of Crystal Lake evidently was lowered some 100 years ago as indicated by the elevation marker near the north shore of the lake. Many of the lots investigated are in the lowered lake level zone and a natural soil profile has not had time to develop. Natural drainage conditions and depth to seasonal high water table were difficult to determine in many instances.

A majority of the lots investigated had summer seasonally occupied dwellings on them. The permeability is rapid in most of the soil material. The septic tank absorption fields may operate during the dry season but the water table being at a relatively shallow depth in much of the area by the lake may be contaminated by leachate from the septic systems.

Parts of some of the outlying areas are in intensive use like subdivided platts, orchards, and golf courses or are dissected by waterways which would make them unavailable or their use restricted for effluent disposal.

If clarification of any of this material is needed, please let me know.

Sincerely,

Richard L Larson

Richard L. Larson
Soil Scientist

Attachments

cc: Mr. Al Krouse, USEPA-Region V
Mr. William J. Fude, SCS

Crystal Lake Area of Benzie County, Michigan

Location	Permeability (inches/hr.)	Depth to seasonal high ground water level	Slope (%)	Limitation and/or hazard for absorption field	Observation Notes
SEG.1(north 1)	> 20	6 inches	0-1	wetness	water table at 24"
(north 2)	6-20	6 inches	0-1	wetness	water table at 46"
SEG.1(south 1)	6-20	15 inches	1-3	wetness	
(south 2)	6-20	15 inches	1-3	wetness	
SEG.2(west 1)	6-20	18 inches	0-4	wetness	water table at 36"
(west 2)	6-20	30 inches	0-4	wetness	3" fill material
SEG.2(east 1)	6-20	15 inches	0-2	wetness	water table at 36"
(east 2)	6-20	15 inches	0-2	wetness	water table at 42"
SEG.3(west 1)	6-20	>60 inches	18-30	(1)	house built on dug out and leveled area
(west 2)	2-20	>60 inches	18-30	(1)	
SEG.3(center 1)	6-20	>60 inches	0-2	(1)	
(center 2)	2-20	>60 inches	12-30	(1)	hilly area above bluff
SEG.2(east 1)	6-20	18 inches	0-2	wetness	water table at 36"
(east 2)	6-20	24 inches	0-2	wetness	water table at 42"
SEG.4(east 1)	6-20	24 inches	0-3	wetness	(north side of road) water table at 60"
(east 2)	6-20	15 inches	0-3	wetness	(south side of road) water table at 27"
SEG.4(west 1)	6-20	15 inches	0-2	wetness	(south side of road) water table at 48"
(west 2)	.2-.6	6 inches	0-2	wetness	(north side of road) water table at 30"

Location	Permeability (inches/hr.)	Depth to seasonal high ground water level	Slope (%)	Limitation and/or hazard for absorption field	Observation Notes
SEG.5(west 1)	6-20	6 inches	0-2	wetness	water table at 18" (2 ft. of sandy fill on much of the lot)
(west 2)	6-20	6 inches	0-2	wetness	water table at 15"
SEG.5(center 1)	6-20	>60 inches	2-6	(1)	north side of road
(center 2)	6-20	15 inches	0-2	wetness	south side of road
SEG.5(east 1)	2-20	6 inches	0-2	wetness-flooding	55" alluvium
(east 2)	.6-20	36 inches	0-3	(1)	6" clay loam overwash
SEG.6(west 1)	6-20	12 inches	0-2	wetness	12" fill material water table at 29"
(west 2)	6-20/.2-6	15 inches	0-2	wetness	6" fill material water table at 36" clay loam at 42"
SEG.6(east 1)	6-20	6 inches	0-2	wetness	6" fill material water table at 36"
(east 2)	6-20/.2-.6	15 inches	0-2	wetness	water table at 40" sandy loam at 44"
SEG.7/8(west 1)	2-20	18 inches	6-18	wetness	sandy to loamy fill, springs, water table at 23"
(west 2)	6-20/.2-.6	10 inches	0-2	wetness	10" of fill material clay loam at 27" drains nearby
SEG.7/8(center 1)	2-20	24 inches	4	wetness-flooding	waterway and colluvium water table at 36"
(center 2)	2-20	>60 inches	12-18	(1)	houses on cut and fill on hill
SEG.7/8(east 1)	6-20	>60 inches	6-12	(1)	house on cut and fill

Location	Permeability (inches/hr.)	Depth to seasonal high ground water level	Slope (%)	Limitation and/or hazard for absorption field	Observation Notes
(east 2)	6-20	>60 inches	2-6	(1)	
SEG.9/10(north 1)	6-20	>60 inches	1-4	(1)	
(north 2)	6-20	>60 inches	1-2	(1)	
SEG.9/10(south 1)	6-20	>60 inches	3	(1)	
(south 2)	2-20	>60 inches	1-4	(1)	in back of bluff to Lake Michigan
SEG.9/10(center 1)	6-20	>60 inches	10	(1)	on side of hill
(center 2)	.2-20	>60 inches	1-4	(1)	on top of hill
SEG.11(west 1)	6-20	15 inches	0-2	wetness	water table 48"
	>20	>60 inches	1-3	(1)	old beach ridge
SEG.11(west-center 1)	6-20	>60 inches	10	(1)	
(west - center 2)	.6-6	40 inches	8-12	wetness	moderately well drained
SEG.11(east-center 1)	6-20/.2-.6	30 inches	1-6	wetness-percs slowly	moderately well drained
(east - center 2)	2-20	6 inches	0-2	wetness	aquafer at 48" perched water table at 24"
SEG.11(east 1)	6-20	18 inches	0-3	wetness	water table at 48"
(east 2)	.2-.6	>60	6-18	percs slowly	
SEG.12(west 1)	.2-6	>60	10-30	percs slowly (1)	above Nester bluff
(west 2)	2-20	6 inches	1-3	wetness	water table at 36"

Location	Permeability (inches/hr.)	Depth to seasonal high ground water level	Slope (%)	Limitation and/or hazard for absorption field	Observation Notes
SEG.12(center 1)	2-20	12 inches	0-3	wetness	water table at 30"
(center 2)	.2-.6	>60	18-50	Slope and percs slowly	springs and gullys
SEG.12(east 1)	6-20	12 inches	0-3	wetness	water table at 30"
(east 2)	6-20	18 inches	0-3	wetness	water table at 48"
SEG.13(west 1)	6-20	18 inches	0-2	wetness	water table at 50"
(west 2)	6-20	24 inches	0-2	wetness	water table at 50"
SEG.13(center 1)	>20	>60 inches	0-4	(1)	
(center 2)	6-20	12 inches	0-2	wetness	water table at 45"
SEG.13(east 1)	6-20*	>60 inches	12-18	slope (1)	*.2-.6 layer at 24" in part of the area
(east 2)	6-20	18 inches	0-3	wetness	water table at 40"
SEG.14(west 1)	6-20	>60 inches	6-18	slope (1)	strata of sandy loam in bluff face
(west 2)	6-20	18 inches	0-3	wetness	water table at 30"
SEG.14(center 1)	6-20	>60 inches	12-30	slope (1)	strata of sandy loam in bluff face
(center 2)	6-20	18 inches	0-3	wetness	water table at 30"
SEG.14(east 1)	6-20	30 inches	0-3	wetness	water table at 48"
(east 2)	2-20	24 inches	0-3	wetness	water table at 36"
SEG.15(west 1)	6-20	15 inches	0-3	wetness	muck at 48-55" water table at 30"
(west 2)	6-20	15 inches	0-3	wetness	water table at 48"
SEG.15(east 1)	.2-20	6 inches	0-2	flooding-wetness	floodplain water table at 30"
(east 2)	> 20	>60	10	(1)	old beach ridge

Location	Permeability (inches/hr.)	Depth to seasonal high ground water level	Slope (%)	Limitation and/or hazard for absorption field	Observation Notes
SEG.16(west 1)	6-20	30 inches	0-3	wetness	water table at 36"
(west 2)	6-20	15 inches	0-3	wetness	water table at 24"
SEG.16(east 1)	6-20	18 inches	0-3	wetness	water table at 36"
(east 2)	> 20	18 inches	0-3	wetness	water table at 60"
Village of Benzonia					
(NE Cor. 1)	.6-20	> 60 inches	1-3	(1)	on edge of steep area
(NE Cor. 2)	.6-20	> 60 inches	1-3	(1)	on edge of steep area
(west)	.2-6	> 60 inches	6-12	percs slowly	water way on lot
(south)	6-20	> 60 inches	2-6	(1)	
SW Cor. Sec. 35	.2-6	original surface	0-1	wetness	4-5 feet of sandy and loamy fill over muck
SE Cor. Sec. 26	.2-20	> 60 inches	2-6	slow perc and (1)	complex of Kalkaska, Leelanau, and Nester
NE Cor. Sec. 35 (east)	6-20	> 60 inches	6-12	(1) slope	house on terraced lot with cut and fill
NE Cor. Sec. 35 (west)	6-20	> 60 inches	1-3	(1)	waterway crosses lot

(1) Pollution hazard to shallow water supplies

Appendix E

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) <u>obvious</u> sewage treatment problems with clearly defined solutions b) <u>no problem</u> and c)<u>exposure to potential problems</u> 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 min/inch percolation rate. Soil permeability will be assessed by evaluating 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 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 with 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. Extreme methods of disposal, such as, cesspools, the proverbial "55 gallon drum" septic tank and systems which feature direct discharge of septic tank effluent to surface or ground water will be considered direct evidence of component failure.

9. On-site systems a) incorporating components, or 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 the on-site system and its performance

2. review of soils maps

3. review of local permit records

4. lot elevations 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:

a) obvious-problem
b) no-problem
c) inconclusive

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 known information and to plan detailed on-site investigations to obtain supporting data. This on-site investigation would consist of representative sampling to confirm the assumptions made 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 need 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 78-9 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 min/in) 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 occurance of wastewater treatment deficiencies. The number of lots, or 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 requirements 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 evaluated and utilized as pollution indicators include, but are not limited to: chlorides, nitrates, phosphate, fecal coliform, surfactants, whiteners or 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, residences should be categorized as follows:

1. 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.

2. Residences not having adequate treatment facilities

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

b) Capable of on-site upgrading with non-standard on-site treatment.

c) 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 upgrading 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 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.

B. The public meeting required by 40 CFR 35.917-5, 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(b) should be scheduled at the end of facilities planning.

Appendix F

Revised Effluent Limitations for Discharge to Betsie Lake

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

HOWARD A. TANNER, Director

STEVENS T. MASON BUILDING
BOX 30028
LANSING, MI 48909

April 30, 1980

Mr. Don Graves, Chairman
Benzie County DPW
1315 South Shore Drive
Frankfort, MI 49635

Re: Benzie County - Crystal Lake Area
Effluent Limits for Frankfort/Elberta
C262844-01, Step 1

Dear Mr. Graves:

Recently updated effluent limits were requested for the subject project. We have received the following information. The revised recommendations resulted from the Advanced Waste Treatment checklist justification made by the Comprehensive Studies and Biology Sections. The proposed discharge would be Betsie Lake in Section 27, T26N, R16W. The proposed design flow would be 0.6 MGD.

Betsie Lake at the above location is protected for coldwater fish, total body contact recreation, industrial water supply, navigation, and agricultural uses.

The Biology Section recommends that land treatment alternatives be employed if at all possible, however, if this is not feasible, the waste should be discharged through the channel at Lake Michigan instead of to the lake itself.

For a discharge at or below the 0.6 MGD design flow to Betsie Lake, the following effluent limitations are recommended:

5-Day Biochemical Oxygen Demand (Total) -- 30 mg/l as a 30-day average, 45 mg/l as a 7-day average.

Total Suspended Solids -- 30 mg/l as a 30-day average, 45 mg/l as a 7-day average.

pH -- not less than 6.0 nor more than 9.0.

Fecal coliform bacteria -- 200/100 ml as a 30-day geometric mean, 400/100 ml as a 7-day geometric mean.

Total residual chlorine -- 0.024 mg/l as a daily maximum (lake discharge), 0.05 mg/l as a daily maximum (channel discharge).

Total phosphorus as P -- 1.0 mg/l as a 30-day average.

Please feel free to contact myself or Clif Clark of my staff should you have any questions regarding this letter.

Very truly yours,

WATER QUALITY DIVISION

Richard Hinshon, Chief
Grants Administration Section

RH/CC:clp
cc: City of Frankfort
Village of Elberta
McNamee, Porter & Seeley, Inc.
Fred Eyer
Engineering & Technical Services Section
Planning Section
Municipal Design Review Section
N. W. MI. Reg. Plann. and Dev. Comm.
Elaine Greening

Appendix G

Sample Easement Form

SEWER EASEMENT AND RIGHT OF WAY

(I)(WE) _____

_____

_____

of _____

_____

_____

respectively, in consideration of the prospective benefits to be derived from a new or upgraded sewer and/or improved water quality in Crystal Lake, do hereby convey and release to the (to be decided) an easement and right of way for unlimited access to the present or future on site sewer system or other systems of sewage disposal, at all reasonable times for such purposes as inspection, monitoring, construction, maintenance, operation, rehabilitation, and replacement, over, upon and across lands owned by (me)(us) and situated in the Township of _____, County of Benzie, State of Michigan, and more particularly described as follows:

In witness, whereof, I have hereto set my hand this _____ day of _____, 19____.

WITNESSES:

_____ _____

_____ _____

_____

_____

STATE OF _____)
) ss.
COUNTY OF _____)

Subscribed and sworn to before me this _____day of _____, 19___.

_____
Notary Public

My commission expires:

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