MINNESOTA POLLUTION CONTROL AGENCY

ENVIRONMENTAL PROTECTION IN THE COASTAL ZONE

(LAKE SUPERIOR BASIN AND NORTH SHORE REGION)

CONTRACT REPORT FOR

U.S. DEPARTMENT OF COMMERCE,

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

VIA

MINNESOTA STATE PLANNING AGENCY, DIVISION OF ENVIRONMENTAL PLANNING,

LAND USE SECTION

COASTAL ZONE MANAGEMENT PROGRAM

OCTOBER 1975

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CHAPTER I

INTRODUCTION

INTRODUCTION

Background, Purpose and Scope

Approximately three man-months of effort between August and October, 1975 are represented by this report, which is in response to the attached contract (see Appendix) and oral requests. Implications for policy formation were requested to supplement written contract provisions; and discussions on energy, resource development, comprehensive environmental management and other topics are included to satisfy such oral requests.

The overall approach has been to translate technical data into narrative, tabular and illustrative forms; to replace "shop talk" with understandable terms and language meaningful to citizens and Coastal Zone work members; and to provide useful examples of complex situations when appropriate.

The main purpose of this report is to identify major current, future and potential impacts of this Agency's activities on the Lake Superior Coastal Zone environment in Minnesota. The summary section in Chapter II should clarify major aspects of these impacts and indicate certain findings.

CHAPTER II

SUMMARY

SUMMARY

As indicated in the Introduction, this Summary relates to the conclusions and recommendations and purpose and scope in Chapters 1 and 3, and is a concise description of the major aspects, findings and substantive impacts relative to current, future and potential Agency impacts on the environment of the Coastal Zone.

The Coastal Zone should continue to be monitored for air, water and land-related environmental components to further refine existing pollutant information. The quality of life and the environment should be measured in a consistent way to assume a relatively uniform, comparable and understandable assessment of the Coastal Zone environment, and to show the status towards attaining non-degradation of the existing relatively high-quality environment in the North Shore of Lake Superior. A comprehensive environmental quality index could facilitate such an assessment of the Coastal Zone's environment.

In terms of water, air and solid waste, the Coastal Zone has been improving during the 1970-1975 period. Data gaps exist for monitoring; and personnel, research and other limited resources hinder a thorough analysis of the environment relative to MPCA's activities in the Coastal Zone.

Water Quality

Overall water quality is excellent in the Lake Superior Basin, which includes the three sub-basins: Lake Superior, St. Louis River and Nemadji River (see Figure 1). Major problem areas are Duluth-Superior Harbor, Silver Bay and the south shore of the lake. Monitoring and study programs to date indicate good water quality in the open waters of Lake Superior, slightly lower quality in the tributaries, lower in the Nemadji River and poor quality in the lower portion of the St. Louis River. The high pollution level in the Duluth Harbor, referred to hereafter as the St. Louis Bay, adversely affects the extreme western end of Lake Superior. In addition, analysis of shipping activities, open-lake dredged spoils dumping and other impacts should be undertaken.

Due to the lake's current patterns, shore and wind characteristics, eddy structure and artificial elevation of the lake level, "turbidity trapping" is a process at the (Duluth-Superior) St. Louis Bay which should be reviewed; and since public water intakes are concerned, physical, chemical and biological aspects should be analyzed to determine existing or potential hazards concerned.

The Nemadji River Sub-Basin in Minnesota contains no "point sources," but turbidity in the Duluth-Superior Bay is impacted by sedimentation caused by the bluffs area along the south shore of the lake. Tributaries flowing through red clay deposits possibly contribute suspended solids problems in portions of north and south shores at the western end of the lake. The Nemadji itself is characterized by relatively poor water when compared to trout streams prevalent along the North Shore.

The Lake Superior Sub-Basin water quality is currently impacted by Reserve Mining's Silver Bay plant's taconite tailings discharge, four wastewater treatment plant discharges and potential degradation from Thunder Bay, dredging, septic tanks, vessel wastes and potential copper and nickel mining -- these last sources are currently not documented. The Reserve situation involves selection of an appropriate on-land disposal site, and the EPA and the State of Minnesota are coordinating progress. Two Harbors, Silver Bay and Grand Marais have completed treatment facility plant construction and should soon be operational; and Taconite Harbor's existing primary plant is scheduled to be replaced by a soil absorption field. The net counterclockwise circulation pattern of Lake Superior may be bringing Thunder Bay's paper-related process wastewater and domestic sewage discharges to the Minnesota portion of Lake Superior. Dredging in Silver Bay and proposed dredging in Grand Marais might affect near-shore water quality similar to Two Harbors and Duluth dredging activities. Surveys are currently underway in St. Louis County on septic tank discharges, and Lake and Cook Counties will be surveyed during the next two years to determine the nature and extent of direct discharges to Lake Superior. Although specifics are currently unknown about copper and nickel development, significant potential water quality impacts may be realized if such operations impact sites in or near the region. Vessel wastes - including ballast, bilge and sewage discharges - are currently unknown; and increased petroleum transporting could include spillages anywhere along the shore.

The St. Louis River Sub-Basin includes the upper and lower reaches. The Lower Portion of the St. Louis River is impacted by the discharge of municipal, industrial and natural background sources. While the upper reaches have some fecal coliform problems in local areas, these are considered insignificant; and the MDNR has classified this a state-designated wild river. The WLSSD plant will remove effluent from the St. Louis River by mid-1977 by regionalizing five industrial and four Duluth plants. Phasing out these discharges will place (a secondary level of treated discharge with phosphorus reduction) an improved effluent in the St. Louis Bay by removing current discharges to the St. Louis River. Benthic sludge deposits and historical accumulations of bottom sediments, including toxic substances, will remain a problem; and dredging would further aggravate the current dissolved oxygen situation.

Area-wide, regional wastewater treatment facilities planning includes management strategies designed to satisfy environmental, economical, social-political and technological requirements regarding eligible projects for a dozen projects, as illustrated in Chapter III, relative to sanitary districts and future planning aspects. Future planning strategies would tend to direct new large-scale wastewater dischargers to areas with urban-type services. Scattered development patterns are neither efficient to manage nor environmentally sound from a water resource management standpoint. Construction of new heavy industry and associated facilities should be directed to sites within existing urban centers.

Air Quality

Although the 1974 data are discussed below, the 1970 to 1975 period for Duluth has indicated major improvements in air quality due to the elimination or reduction of pollution sources. Open burning from old city dumps has almost completely stopped.

The air quality assessment considers only the 1974 emission inventory and air quality data. No attempt to look at multi-year data was made; trending was not felt to be within the time frame available for documentation here. Neither were projections made for future air quality in the Coastal Zone. Future planning within newly defined programs such as the Air Quality Maintenance Area program will identify term projections.

1974 Air Emission Inventory

Table II in Chapter III, B shows that only 12% of all particulates are emitted in the St. Louis Coastal Area (Duluth). In addition, 41% of all sulfur oxides, 25% of all carbon monoxide, 83% of all hydrocarbons and 25% of all nitrogen oxides emitted in St. Louis County are emitted in the Coastal Area (Duluth). The bulk of particulate, sulfur oxide, carbon monoxide and nitrogen oxide emissions within St. Louis County are emitted by inland taconite processing plants. On the other hand, the bulk of hydrocarbons are emitted in Duluth, reflecting mobile and stationary source emissions.

It should be noted here that emissions from Wisconsin (Superior) and nearby Cloquet are not considered in this report, but the effect upon air quality from these additional emissions is inseparable from the total air quality problems.

It should also be observed that the potential particulate which could be emitted in St. Louis County is 30 times greater than the actual emission in St. Louis County. This fact reflects the impact of planned or proposed taconite expansion.

1974 Air Quality Data

Air quality was exceedingly good in Duluth for 1974, with only

air quality standards for particulate matter being exceeded. Data was taken only for total suspended particulates, sulfur dioxide and nitrogen dioxide; however, additional assessments for carbon monoxide and photochemical oxidants will be made in 1975 since there have been indications of standards being exceeded for those two pollutants.

Future Planning Strategies

From existing data, several salient factors have surfaced relative to the North Shore Coastal Zone: 1) particulate air pollutants are affected by industrial processes in significant amounts since 53% of the total particulate air pollutants are emitted from such sources; 2) it is difficult to predict the degree to which mining operations will affect North Shore air quality; 3) curtailment of steel and cement operations in the region will improve air quality, but the amount that such apparent reductions will be offset by the increase of mining and related operations is currently undeterminable. Future air quality management will have to keep in mind these considerations.

The development of air quality management strategies will include intergovernmental coordination in addition to emission control measures. Air quality management strategies include air quality standards specifically for the Duluth city limits in addition to other limitations for specific air pollutant characteristics. Although the AQMA in Minnesota is still in the initial planning stage, the local, county, regional, state and federal Coastal Zone Management efforts may wish to consider developmental opportunities relative to this concept. In essence, urban planning policies must begin to consider the impacts which plans and programs have on air quality.

Noise Abatement

The most limited of current major Agency activities is the noise pollution abatement control program. Since 1974, the staff has concentrated on transportation-related aspects of noise controls due to the extreme Agency resource limitations.

In the Coastal Zone, airports, major road intersections, highways, rails, motorcycles and freight-handling trucks are major transportation-type sources of noise although numerous other noise sources exist.

State regulations are characterized by a central land management feature -- various land activity classifications grouped in four major "noise area classification" categories. Future noise controls in the Coastal Zone require essentially that NPC-1 and 2 standards must be met. New developments would be subject to

identical performance requirements as existing sources of noise pollution, which are categorized within the regulations (mentioned above) as to land use/activity types. However, non-degradation of wilderness, wildlife and other such areas has impacts on Coastal Zone development in addition to minimum requirements; and these should be considered.

Solid Waste Management

The Coastal Zone has made major strides from the old situation of uncontrolled open burning dumps toward an environmentally sound Solid Waste Management Program. During the 1970 to 1975 period, the region has been in a transition stage from minimal activity to more positive actions directed toward solid wastes inventory, assessment, demonstration projects and alternatives selection. Any assessment of the effect of solid waste disposal on the environment might be in terms of overall program outputs such as the number of 1970 open dumps, the number closed (Figure 2 in Chapter III,D); the elimination of related hazards and nuisances (disease, odor, incineration, site destruction from uncontrolled access to numerous dumps, etc.); the number of modified landfills and sanitary landfill sites opened and with improved performance; recycling efforts, including the number of abandoned motor vehicles collected and transported, the number and type of studies conducted; and public awareness and management preferences.

Solid Waste's related management strategies will continue to eliminate disposal sites located in shoreland zones. The first ph ase of protecting human health from disease caused by rodents and air quality degradation from open burning is almost complete. A second phase is underway to continue replacement of numerous scattered dumps by fewer sites, properly operated, and to introduce resource recovery as a potential alternative to disposal. Landfill operations which have problems concerning groundwater or surface water contamination from recently required monitoring must be improved if the water pollution potential is considered significant. Sites will be fewer and larger landfill operations located near current and future population concentrations, and selected operations will be eliminated or reduced in scale due to potential future technology, legislation or environmental research. A final phase of special wastes handling will address hazardous wastes, sludge disposal and other such considerations, and their relationship to a central resource recovery site in Duluth.

Land-Related Comprehensive Environmental Management

Environmental strategies in standards and regulations are currently separated into manageable sectors of water, air and noise, and solid waste in the MPCA. The Minnesota Department of Health and MPCA currently shore state-wide responsibility for the control

of septic tanks, and the Department of Natural Resources also has responsibility relating to shoreland and floodplain areas management. There is interagency coordination among federal, federal-state, regional, and local special and general-purpose governments which potentially impact Coastal Zone development, resource management, and environmental protection and preservation, including the National Environmental Protection Act, Federal Water Pollution Control Act Amendments of 1972, Minnesota Environmental Policy Act, Coastal Zone Management Act and others. Essentially, however, water quality strategies call for concentrating development according to transportation patterns which, in turn, allow access for development. Water and sewerage needs are integral components here. Air quality in the future has a leadership role, as do circulation patterns, water quality strategies and noise. Solid waste appears to follow development rather than lead it in terms of critical comprehensive resource management impacts. Local, regional, state and federal levels of government must somehow be more effective in coordinating and implementing these strategies.

Land-related elements of the Coastal Zone environment are inseparable from air, water, solid waste and other elements in practical and ultimate terms. The carrying capacities of land are likewise inseparable from interactions with water, air, and other density and scale indicators of over-saturation or over-use. Real estate, landscape architecture, meteorological, hydrological, urban planning, economic, academic and professional interdisciplinary efforts are essential to determine "highest and best use" of land-air-water management in addition to current engineering, legal and administrative leadership. Long-range capital investments in addition to environmental parameters will become increasingly critical as energy, land and materials management compete with permit requirements for specific physical, chemical, biological case-by-case administration of air, water, noise, solid waste and other front-line abatement measures.

Specific and broad environmental policies written clearly by all Coastal Zone Management participants are essentil for comprehensive environmental management. Specific developmental planning criteria from the MEQC and State Planning Agency's Environmental Planning Section, Development Planning Division, would be desirable to provide leadership for a comprehensive environmental resource development approach. Although guidelines exist for initial threshold limits, refined criteria would extend initial environmental project assessment to a comprehensive critical area approach. An annual Environmental Quality Index would also indicate the status of attaining non-degradation of the state and Coastal Zone environments, and appropriately identify specific critical parameters from a comprehensive approach.

CHAPTER III

MPCA ENVIRONMENTAL PROTECTION

IN THE COASTAL ZONE

III. MPCA ENVIRONMENTAL PROTECTION IN THE COASTAL ZONE

WATER-RELATED ACTIVITIES

Introduction

The attached illustration indicates the Coastal Zone relative to the Lake Superior Basin, including the three sub-basins -- Lake Superior St. Louis River and Nemadji -- and shows problem areas adversely affecting water quality in the lake. Overall water quality in the basin is excellent. Major problem areas are Duluth-Superior Harbor, Silver Bay and the southern shore of the lake.

Monitoring and study programs, including tributary sampling, near shore surveys and routine surveys, indicate good water quality in the lake, slightly lower quality in the tributaries and lowest quality in the lower portion of the St. Louis River. Two routine monitoring stations along the North Shore (during October, 1973 to September, 1974) at the water supply plant intakes of Grand Marais and Silver Bay indicated several ammonia violations of standards. Of 34 parameters monitored on the annual mid-lake sampling run composed of six stations located along the Minnesota/Wisconsin/Michigan border in Lake Superior, no violations were found of the State's water quality standards.

Under the International Joint Commission study to determine constituent loads to Lake Superior from streams and wastewater treatment facilities relative to Minnesota "point" sources, the tributaries sampled have indicated very good quality except for the St. Louis and Nemadji Rivers. This study is discussed in the section entitled "Tributary Sampling" and in the "Lake Superior Sub-Basin" section following.

Another study in progress, the Near Shore Lake Superior Study, indicates that effects of tributary"runoff"on near shore areas in the lake are insignificant for the Gooseberry and Cascade Rivers when compared to Duluth Harbor runoff effects. This study included that the western portion of Lake Superior is influenced by the eutrophic Duluth Harbor, hereafter referred to as the St. Louis Bay. "The bacteriology, phytoplankton and water chemical data indicate the adverse influence that the harbor outflow has on the extreme western end of Lake Superior. The effects of the harbor are reflecting higher populations of algae and zooplankton, lower secchi disc readings, and higher levels of chlorophyll "a" and turbidity in Lake Superior near Duluth, compared to the open lake" (from reference #3 in Bibliography). Near shore water quality, except for the Duluth area, is close to the very high quality of the open waters of Lake Superior, as indicated by the phytoplankton, zooplankton, bacteriological, benthic and water chemical data.

An EPA and NASA study by M. Sydor, "Turbidity in Extreme Western Lake Superior" using Earth Research Telecommunications Satellite (ERTS) infrared photographs during 1972 to 1974, examined wind, erosion and harbor activities. Shore erosion is noted to be a relatively uniform source of turbidity, such as red clay; however, "the effect of the harbor effluents on people and aquatic life is not known." The author

urges that a full analysis of shipping activities', open-lake dredged spoils dumping and other pertinent activities' impacts on water quality in the western part of Lake Superior be taken.

In the summer of 1975, the MPCA Regional Representative, John Pegors, emphasized the process of "turbidity" in the Duluth-Superior area due to the lake's current patterns, shore and winds' characteristics, eddy structure and 11-inch elevation of the lake level by artificial controls. Since public water intakes are concerned, the physical, chemical and biological aspects must be analyzed at some point to determine existing or potential hazards concerned.

Individual sewage disposal systems, principally septic tanks and drainfields, are a widespread non-point source of water quality degradation along the entire North Shore of Lake Superior. Proper installations, operation and maintenance are essential if these systems are to be used for domestic sewage disposal purposes -- especially beyond municipal boundaries on clay or rock ledges and with current water use patterns. Reduced water consumption and dry waste systems are potential remedies. Surveys currently underway in St. Louis County and Lake and Cook Counties (see "primary study area" in Figure 1) are scheduled to be inventoried for problems next. Satisfactory performance alternatives, soil analysis and legislative appropriations are key factors necessary for a successful program to improve water quality.

"Water quality problems at Thunder Bay include low dissolved oxygen, taste and odor in fish, and high levels of coliforms," according to the International Joint Commission's 1974 information report (see reference #6 in Bibliography in Appendix). The Minnesota portion of Lake Superior is affected by the lake's net counterclockwise circulation pattern; and water quality impacts from paper-related processes and domestic sewage wastes may be having impacts on Cook, Lake and St. Louis Counties' water.

Dredging operations in Two Harbors, as well as the Duluth-Superior Bay, is one type of future development which will have impacts on water quality in the Coastal Zone. Deposition of bottom dredged spoils, if returned to the lake or if not properly performed, could have adverse effects. In addition, dredging in Silver Bay and proposed dredging in Grand Marais might affect near shore water quality along the North Shore similar to Two Harbors and Duluth Harbor dredging activities.

Another type of future development, copper and nickel and activities associated with copper and nickel development in the region, could conceivably have some of the most serious water quality related impacts ever known to the Coastal Zone. Precise sites, activities and specific problems are currently unknown; but the quality of the water and the other aspects of the Coastal Zone environment might be compromised in the future.

Tributary Sampling

Sampling is now completed for the Lake Superior Tributary project; and most data is now stored in a final, corrected form in the STORET computer system. Final report preparation is underway towards a December,

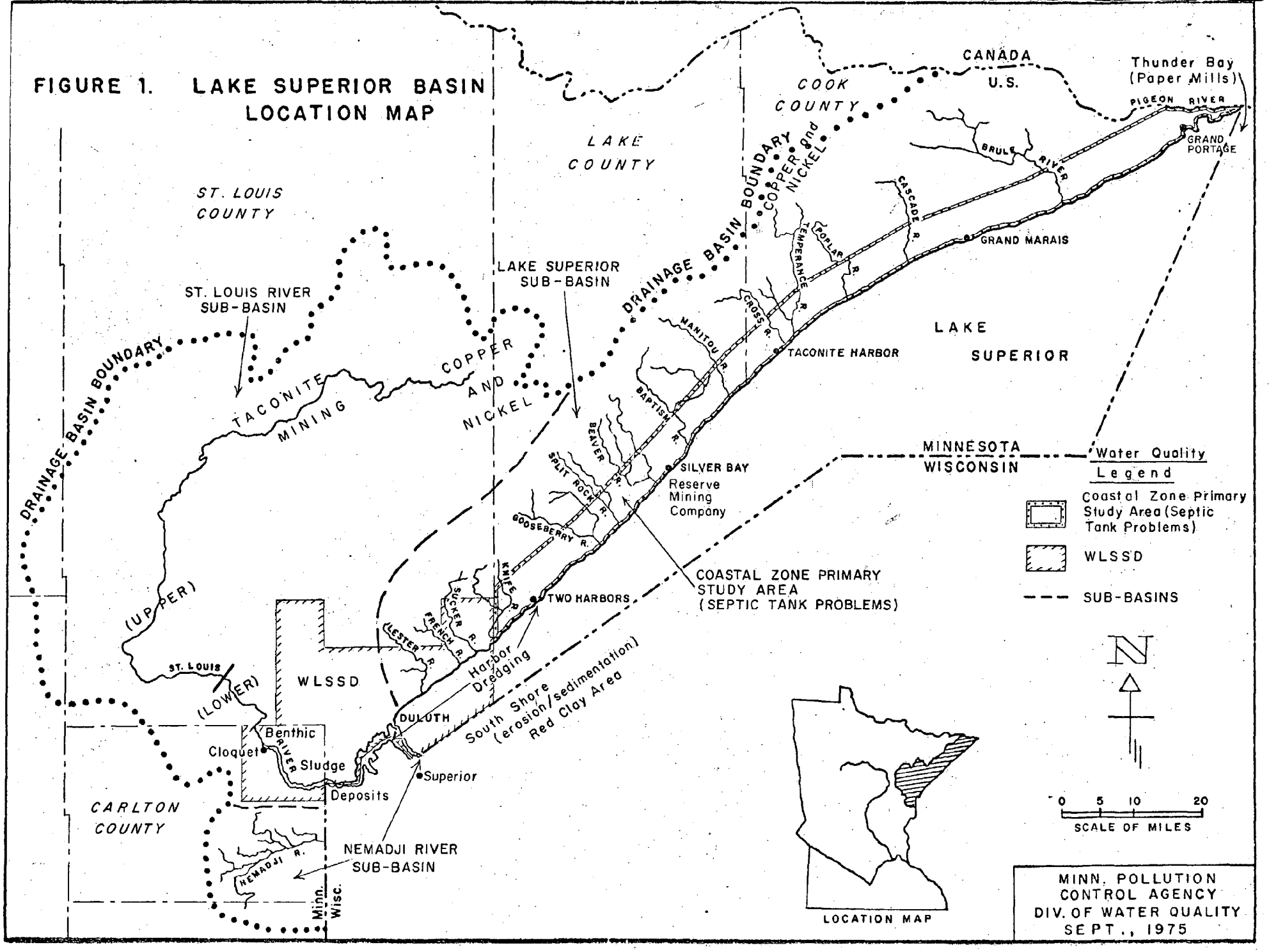


FIGURE 1. LAKE SUPERIOR BASIN LOCATION MAP
CANADA
U.S.
Thunder Bay (Paper Mills)
PIGEON RIVER
GRAND PORTAGE
BRULE RIVER
CASCADE R.
POPLAR R.
TEMPERANCE R.
CROSS R.
MANITOU R.
GRAND MARAIS
TACONITE HARBOR
LAKE SUPERIOR
COOK COUNTY
LAKE COUNTY
ST. LOUIS COUNTY
CARLTON COUNTY
DRAINAGE BASIN BOUNDARY
COPPER and NICKEL
LAKE SUPERIOR SUB-BASIN
ST. LOUIS RIVER SUB-BASIN
TACONITE MINING
COPPER AND NICKEL
(UPPER)
(LOWER)
ST. LOUIS
WLSSD
BAPTISM R.
BEAVER R.
SPLIT ROCK R.
GOOSEBERRY R.
SILVER BAY
Reserve Mining Company
MINNESOTA
WISCONSIN
KNIFE R.
SUCKER R.
FRENCH R.
LESTER R.
TWO HARBORS
COASTAL ZONE PRIMARY STUDY AREA (SEPTIC TANK PROBLEMS)
Harbor Dredging
South Shore (erosion/sedimentation) Red Clay Area
DULUTH
Benthic
Cloquet
Sludge
Deposits
Superior
NEMADJI R.
NEMADJI RIVER SUB-BASIN
Minn.
Wisc.
Water Quality
Legend
Coastal Zone Primary Study Area (Septic Tank Problems)
WLSSD
SUB-BASINS
N
0 5 10 20
SCALE OF MILES
LOCATION MAP
MINN. POLLUTION CONTROL AGENCY
DIV. OF WATER QUALITY
SEPT., 1975

1975 completion date. This work is relative to the IJC program in the Lake Superior Basin. The appendix of this report includes detailed information on this contract, and the following 17 streams in the Lake Superior Basin were included:

1. Baptism River
2. Beaver River
3. Brule River
4. Cascade River
5. Cross River
6. French River
7. Gooseberry River
8. Knife River
9. Lester River
10. Manitou River
11. Nemadji River
12. Pigeon River
13. Poplar River
14. Lower St. Louis River/Bay
15. Split Rock River
16. Sucker River
17. Temperance River

With some exceptions, overall water quality of Minnesota's North Shore tributaries is very good. Chemical and physical quality is excellent, but bacteriological problems exist. Specifically, most streams consistently violate the stringent 10 MPN/100 ml fecal coliform standard that applies to all tributaries except the St. Louis River, which has a 200 MPN/100 ml standard. Phenol values for the St. Louis River are .01 mg/l, and this was violated approximately 50% of the time. Most iron and manganese values exceed State standards. The St. Louis River exhibits the poorest water quality of the 17 sampled streams, with extended low dissolved oxygen periods and frequent copper, oil and grease, and phenol violations.

The Western Lake Superior Sanitary District (WLSSD) is implementing a regional wastewater collection and treatment system which will provide secondary treatment and phosphorus removal at a central location for effluent from major industries and municipalities in the Duluth area. This plant is scheduled to be completed in 1977.

Lake Superior Sub-Basin

The major source of water quality degradation in the Silver Bay area is the continuous discharge of taconite tailings from Reserve Mining Company's plant. Many years are required to discover the full impacts and to flush the majority of asbestos-like fibers from the lake. The Agency and its associate plaintiffs have engaged in court proceedings and out-of-court negotiations for nearly a decade. Reserve was ordered on March 14, 1975 by the U.S. Eighth Circuit Court of Appeals to reach agreement with the State of Minnesota within a reasonable time on an appropriate disposal site for on-land disposal. An environmental impact statement concerning the "Mile Post 7" site is being prepared prior to further action. Some estimate a 2 to 5 year period before implementation occurs. EPA has the option to initiate further legal action if it determines that satisfactory progress is not being made.

Another source of water pollution in the Lake Superior Sub-Basin is four wastewater treatment plants which have been discharging directly to Lake Superior -- Silver Bay, Two Harbors, Taconite Harbor and Grand Marais -- which were regularly sampled during the tributary sampling project. All plants except Taconite Harbor were in the process of upgrading their treatment processes. Taconite Harbor's existing pri-

mary plant is slated to be replaced by a soil absorption field. Sewage disposal to interstate waters requires a minimum of secondary treatment and must meet the following effluent requirements:

5-day BOD	25 mg/l
Fecal Coliforms	10 MPN/100 ml
Total Suspended Solids	30 mg/l
Oil	Essentially free of visible oil
pH	6.5 - 8.5
Turbidity	5 JTU
Unspecified Toxic or Corrosive Substances	None at levels acutely toxic to humans or others or animals or plant life, or directly damaging to real property

In addition, dischargers in the Lake Superior Basin must achieve a limitation of 1 mg/l total phosphorus.

At the Two Harbors Wastewater Treatment Plant, BOD, phosphorus and oil exceed the above standards most of the time. Fifty percent of the samples exceed suspended solids requirement.

At the Silver Bay Wastewater Treatment Plant, all oil and phosphorus and most BOD results were in violation of the above standards. There were scattered suspended solids infractions.

At the Grand Marais Wastewater Treatment Plant, phosphorus, oil and BOD were consistently in violation of the above standards. The majority of the sampling for turbidity and 50% of suspended solids results were in violation.

At the Taconite Harbor Wastewater Treatment Plant, most phosphorus and BOD results were in violation of the above standards.

At the time of this report, the three plants -- Two Harbors, Silver Bay and Grand Marais -- had completed construction and were near operational status. Improvement in effluent quality should soon be achieved.

Specifics of the study, "Sampling and Analysis of Minnesota Tributaries and Municipal Dischargers to Lake Superior to Determine Constituent Loadings," relative to contract provisions, costs, parameters and effluent loadings estimated and monitored during the contract period are available. All data are considered by EPA as preliminary until after their review and approval after December 31, 1975.

St. Louis River Sub-Basin

In the St. Louis River Sub-Basin, the upper and lower reaches of the stream vary considerably in water quality. The Department of Natural Resources has classified the upper portion of the St. Louis River as a state-designated wild river. MPCA data indicate some fecal coliform problems in localized areas, but not in a significant amount.

The lower reaches of the St. Louis River are impacted by the discharge of municipal, industrial and natural background sources. Periodical violations include excessive BOD_5 concentrations and high fecal coliform bacterial counts. Major contributors are Conwed Corporation and Potlatch Forest, Inc. in Cloquet, Minnesota Power and Light Company, U.S. Steel, Superwood, four Duluth sewage treatment plants, harbor traffic and Superior wastewater treatment plants. Conwed, Potlatch and Minnesota Power and Light Company currently discharge wastewater to the Lower St. Louis River. U.S. Steel, Superwood, four Duluth sewage treatment plants and harbor traffic (including vessel sewage, bilge wastewater, ballast wastewater and cargo spillage) affect the St. Louis Bay.

By mid-1977, nine sewage treatment plants in the Cloquet and Duluth areas are scheduled to be phased out; and municipal and industrial dischargers will be diverted to the Western Lake Superior Sanitary District's new plant, which will provide secondary level treatment with phosphorus reduction, and the effluent discharge will go to the St. Louis Bay. The regional facility will be separate from that in Superior, but effluent points will be essentially removed from the St. Louis River on the Minnesota side.

Historical accumulations of wastes settling to the bottom of the river, bay and harbor reaches will continue to limit the water quality attainable. Such extensive sludge deposits are projected to require oxygen uptake for years, and dissolved oxygen in the river is a problem and normally borders on noncompliance during summer low-flow periods even with essentially zero discharge of pollutants upstream from the WLSSD discharge point. (The bay's problem, however, is during the winter.)

Near-shore Duluth-Superior water quality is degraded by high coliforms, phosphorus, suspended solids and turbidity. Harbor dredging and shipping wastes discharge at irregular intervals,and varying rates impact water quality in the shipping channel. The MPCA in September, 1975 was denied a request by the EPA Administrator to petition for prohibition of discharges from vessel wastes, but alternative abatement options are being studied. Increased surveillance of these activities and nonpoint sources' contributions are required to better define and control water quality effects on Lake Superior. A similar scale of impact, although not as land-oriented as copper-nickel mining operations, is the proposed significant increase of refined petroleum products transportation from the Duluth-Superior Bay through the major part of Lake Superior. Additional dredging operations to expand the channel, harbor alterations, increased bilge and sewage disposal problems associated with the additional scale of shipping activities and hazards directly related to spillage of oil would appear to be some of the more serious water quality related aspects of such operations.

Nemadji River Sub-Basin

The Nemadji River Sub-Basin in Minnesota contains no "point" sources known to the MPCA currently. Turbidity in the Duluth-Superior Bay is impacted by sedimentation caused by the bluffs area along the southern shore of the lake. Tributaries flowing through the red clay deposits possibly contribute suspended solids problems in portions of north and south shores at the western end of the lake. The Nemadji itself is

characterized by relatively poor water when compared to trout streams prevalent along the North Shore. Potential "non-Point" source pollution appears most probable due to soils, topography and land uses, including agriculture and construction-related activities. Potential impacts of animal wastes and nutrient fertilizers may be a cause of the fecal coliform, biochemical oxygen demand (BOD_5) and nutrient levels in the streams.

Future Plans for Sanitary Districts, Individual Sewage Disposal Systems and Other Activities

Current Regional/Area-wide Wastewater Treatment Strategies and Sanitary Districts

Illustration of the Lake Superior Basin's "Municipal Wastewater Disposal Facilities, 1974" (see Figure 1-a) indicates the level of treatment given, the location of publicly-owned (municipal and township) facilities and whether or not sanitary collection systems have had a discharge or no treatment as of July 1, 1974. This map does not show areas without collector sewers, areas with septic systems, verified no-discharges from sewer systems or sanitary discharges to separate storm sewers; nor does it indicate separate or combined sanitary and storm sewers. Industries and other non-publicly-owned dischargers not discharging to such systems are not indicated. The map also indicates current areas considered as "appropriate planning areas" for facilities planning purposes. Since facilities planning requirements are a complicated matter and a series of planning strategies are involved, a summary explanation is presented here.

Due to current federal and state legislation which limits the available levels of staff and funds for construction grant projects, which assumes a certain level of technology, including environmental assessment and engineering practices, current strategies are focused toward permitting major dischargers, funding eligible portions of publicly-owned construction projects with appropriately documented needs, and using environmentally, economically, socially and politically acceptable methods to attain water pollution abatement levels. "Regionalism," or multi-jurisdictional cost-effectiveness, is one of the alternatives presently considered as high priority in reviewing such projects at the point of a grant application to expand or modify a treatment system, generation of a permit for a disposal system or a NPDES (National Pollutant Discharge Elimination System) permit, and during review of reports indicating inadequate system performance due to design, operation or maintenance modifications if current growth and development indicate significant future requirements or a combination of cumulative evidence indicates a need to require such considerations.

As a map illustrates, appropriate planning areas indicate the Agency's current regional strategies, especially concerning the following projects over the next 20 years (1975-1995) for multi-jurisdictional projects: the WLSSD (Western Lake Superior Sanitary District), Eveleth-Leonidas-Fayal Township, Hibbing-Stuntz Township (includes Kelly Lake and two plants in Hibbing), Mountain Iron (includes recently annexed Nichols Township, except Leonidas) and Buhl-Kinney. Other areas which include extraterritorial aspects beyond single political jurisdictions consist of Babbit, Hoyt Lakes, Biwabik, Irin Junction, Meadowlands, Floodwood and Silver Bay.

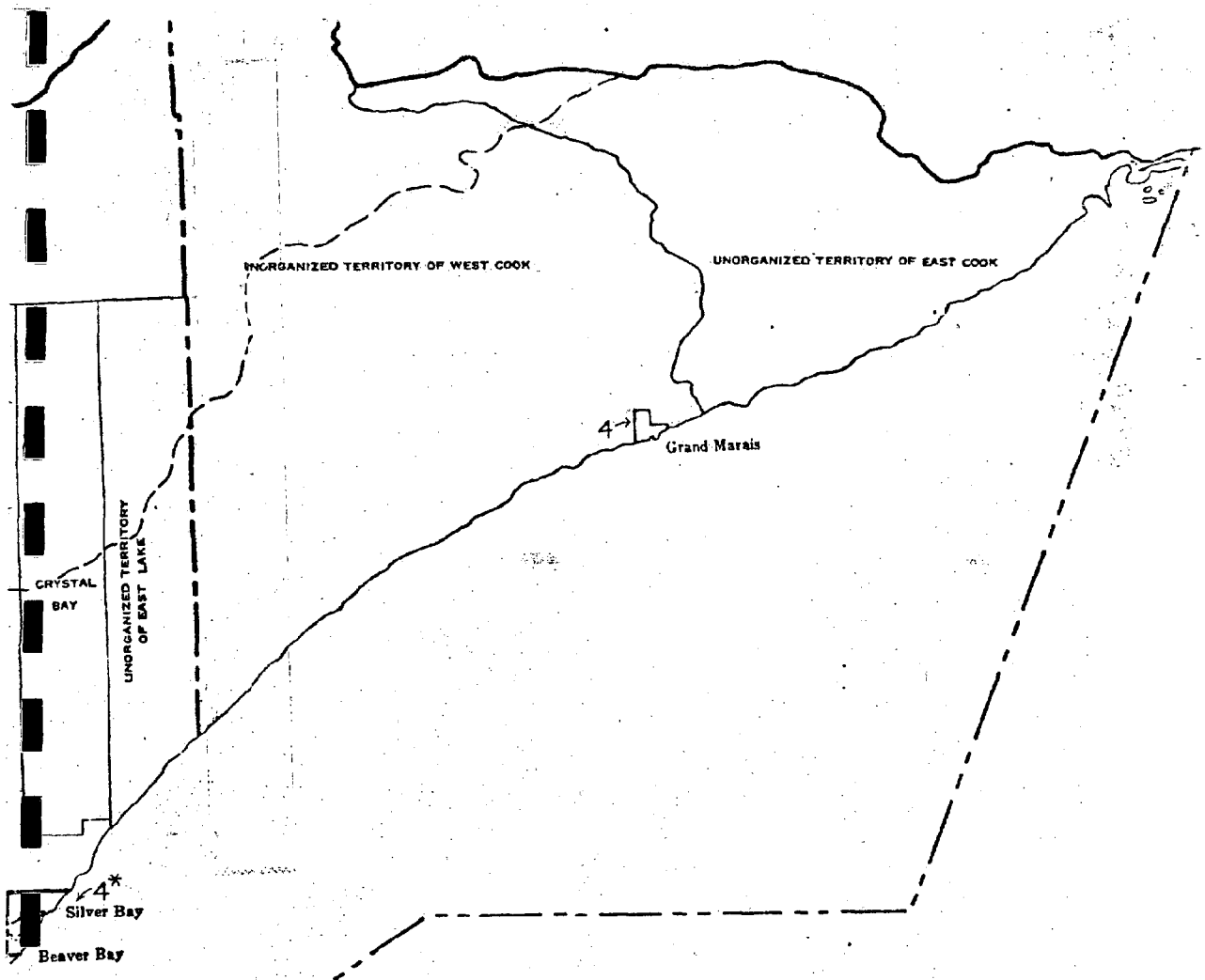


FIGURE 1-a

MUNICIPAL* WASTEWATER DISPOSAL FACILITIES

1974

LEGEND

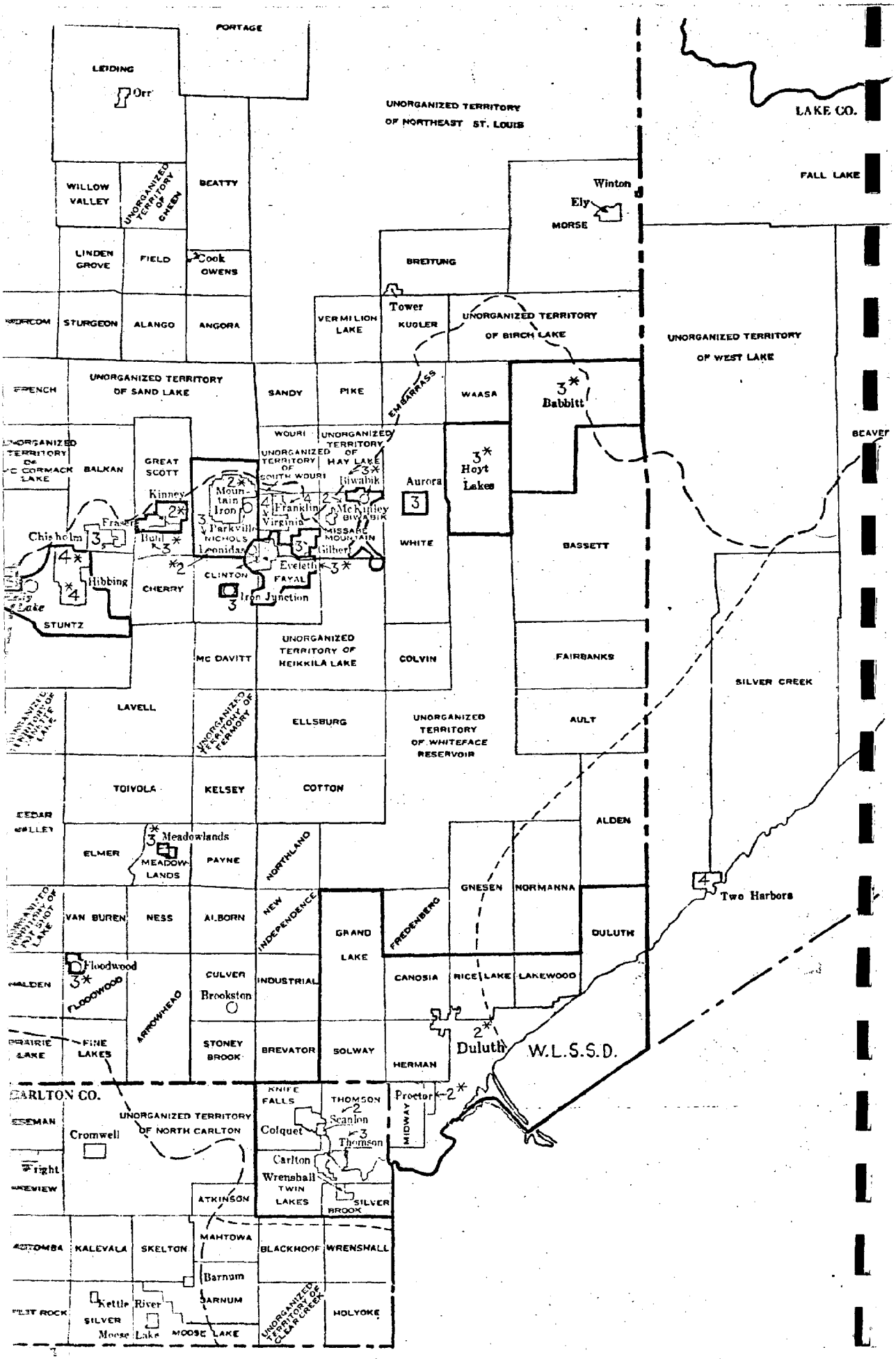
1 — SEWER SYSTEM, NO TREATMENT
2 — SEWER SYSTEM, PRIMARY TREATMENT
3 — SEWER SYSTEM, SECONDARY TREATMENT
4 — SEWER SYSTEM, TERTIARY TREATMENT
5 — SEWER SYSTEM, NO DISCHARGE

*MAP LIMITED TO CITY AND TOWNSHIP DISPOSAL FACILITIES

——— Wastewater Treatment Facilities Planning Areas (* Regional System)

SCALE

10 0 10 20 30 MILES


PORTAGE
LEIDING
Orr
UNORGANIZED TERRITORY OF NORTHEAST ST. LOUIS
LAKE CO.
FALL LAKE
WILLOW VALLEY
UNORGANIZED TERRITORY OF GHEEN
BEATTY
Winton
Ely
MORSE
LINDEN GROVE
FIELD
Cook
OWENS
BRETTUNG
STURGEON
ALANGO
ANGORA
VERMILION LAKE
Tower
KUGLER
UNORGANIZED TERRITORY OF BIRCH LAKE
UNORGANIZED TERRITORY OF WEST LAKE
FRENCH
UNORGANIZED TERRITORY OF SAND LAKE
SANDY
PIKE
EMBARRASS
WAASA
3* Babbitt
BEAVER
UNORGANIZED TERRITORY OF MC CORMACK LAKE
BALKAN
GREAT SCOTT
WOURI
UNORGANIZED TERRITORY OF SOUTH WOURI
UNORGANIZED TERRITORY OF HAY LAKE
Kinney
Mountain Iron
Franklin
Virginia
McKinley
Biwabik
Aurora
3* Hoyt Lakes
Fraser
Chisholm
Hull
Parkville
NICHOLS
Leonidas
MISSABE MOUNTAIN
Gilbert
WHITE
BASSETT
Hibbing
CHERRY
CLINTON
FAVAL
Eveleth
Iron Junction
STUNTZ
MC DAVITT
UNORGANIZED TERRITORY OF HEIKKILA LAKE
COLVIN
FAIRBANKS
SILVER CREEK
LAVELL
UNORGANIZED TERRITORY OF FERMORY
ELLSBURG
UNORGANIZED TERRITORY OF WHITEFACE RESERVOIR
AULT
TOIVOLA
KELSEY
COTTON
ALDEN
CEDAR VALLEY
ELMER
Meadowlands
MEADOWLANDS
PAYNE
NORTHLAND
GNESEN
NORMANNA
Two Harbors
VAN BUREN
NESS
ALBORN
NEW INDEPENDENCE
GRAND LAKE
FREDENBERG
DULUTH
Floodwood
FLOODWOOD
CULVER
Brookston
INDUSTRIAL
CANOSIA
RICE LAKE
LAKEWOOD
ARROWHEAD
PRAIRIE LAKE
FINE LAKES
STONEY BROOK
BREVATOR
SOLWAY
HERMAN
Duluth
W.L.S.S.D.
CARLTON CO.
KNIFE FALLS
THOMSON
Scanlon
Thomson
Proctor
MIDWAY
UNORGANIZED TERRITORY OF NORTH CARLTON
Cromwell
Colquet
Carlton
Wrenshall
TWIN LAKES
SILVER BROOK
ATKINSON
MAHTOWA
KALEVALA
SKELTON
BLACKHOOF
WRENSHALL
Barnum
BARNUM
Kettle River
SILVER
Moose Lake
MOOSE LAKE
UNORGANIZED TERRITORY OF CLEAR CREEK
HOLYOKE

Individual Sewage Disposal Systems

The MPCA is currently drafting regulations dealing with the design, construction, installation, operation and maintenance of conventional septic tank and alternative systems. A Citizens Advisory Committee of approximately 40 persons, including two from the Arrowhead region, was organized in April, 1975 and has been working with the Division of Water Quality staff in developing these regulations, which stress local administration and enforcement. It is estimated that a final set of draft regulations will be available by January 1, 1976 and that the regulations will be in effect before the 1976 construction season.

The Agency is also attempting, again with the aid of the Citizens Advisory Committee, to develop a state-wide program of training and certification of people in the industry -- installers, pumpers and manufacturers of individual systems. Also being considered is a training and certification program for local inspectors, zoning administrators and sanitarians. Both training programs would be in conjunction with the University of Minnesota's Agricultural Extension Service. However, both programs require legislative authorization; and it is not possible to estimate when such programs would become effective.

Funds have been authorized by the Legislature for the purpose of conducting research in the areas of experimental systems and disposal of sewage. Contracts will be awarded, and work will begin next summer.

Finally, a survey is presently being conducted along the North Shore of Lake Superior by the St. Louis County Health Department with funds from the State Planning Agency and cooperation from Lake and Cook County officials. The survey will attempt to correlate septic tank problems and well contamination for establishments in a 5-mile strip along the shore. The MPCA is monitoring the progress of this survey and providing technical input if needed.

Thus, the MPCA is involved in drafting regulations, developing training and certification programs for industry and inspectors, and administering research funds. A survey of individual sewage systems and wells along the North Shore is underway, with the results expected to yield valuable planning information.

Vessel Wastes and Marine Sanitation Devices

Under present state regulations (Minnesota Statutes 1971, Chapter 861, and 1969, Section 361.29), all watercraft must be equipped with "no-discharge" toilets after December 31, 1975. At the same time, however, in newly developed EPA and Coast Guard regulations (Public Law 92-500, EPA part 140 and Coast Guard part 149), flow-through treatment devices would be allowed. Such federal regulations are designed to preempt state enforcement of state statutes from the time of installation of the flow-through device. Although federal regulations will eventually become "no-discharge" types of regulations, there will be considerable delay in reaching that goal, as well as exceedingly liberal periods of time during which such devices may be installed and "grandfathered-in" for as long as the device remains operable.

Federal regulations allow a state to petition the Administrator of the EPA to prohibit the use of flow-through treatment devices on "any or all" waters of the state. On March 3, 1975, Minnesota applied for such a prohibition on Lake Superior. On September 2, the application was denied.

The Agency is presently looking at a number of options to force the federal government to declare Lake Superior (and other waters) as "no-discharge" areas, including appealing the recent ruling, reapplying under other sections of the law or perhaps challenging the concept of preemption of state statutes. In the meantime, however, it would appear that federal law applies.

Water Quality and Related Development Strategies

Water quality related management strategies direct new large-scale development, such as industrial processing operations requiring heavy water consumption, to planned urban areas and multi-jurisdictional, regional-type wastewater treatment management areas. Since urban-type services are considered important, an appropriate level of services appears essential to such developments. Scattered and "sprawl" patterns of development are neither efficient to manage nor environmentally sound from a water resource management standpoint. Therefore, construction of new heavy industry, such as power plants, ore benefication plants, steel mills, foundries, pulp and paper mills, and associated facilities, should be directed to sites within existing urban centers such as the Duluth-Superior region. Permitting requirements regarding performance standards for new wastewater discharge sources will be applied to such new developments, and non-degradation of the water quality will be directed toward further improvement of Lake Superior and the numerous trout streams along its North Shore. Smaller-scale developments, such as recreation and tourism and light industrial activities, should have similar treatment like larger urban centers, but on a smaller scale than Duluth.

AIR QUALITY RELATED ACTIVITIES

Introduction

Although the 1974 data is discussed below, the 1970 to 1975 period for Duluth has indicated major improvements in air quality due to the elimination or reduction of pollution sources. Some industries left. Minnesota Power and Light Company switched from coal to fuel oil. U. S. Steel has greatly reduced operations, and its coke operations are scheduled to cease by 1977. Open burning from old dumps has almost completely stopped.

The intent of this section is to present a brief Air Quality Assessment for the area in Minnesota immediately adjacent to Lake Superior. This assessment includes activities within Cook, Lake and St. Louis Counties. The assessment does not include inland activities such as the inland impact upon the Coastal Area (such as Reserve Mining, Taconite Harbor, Two Harbors taconite loading, etc.).

The Air Quality Assessment considers only the 1974 emission inventory and air quality data. No attempt to look at multi-year data was made; trending was not felt to be within the time frame available for documentation here. Neither were projections made for future air quality in the Coastal Zone. Future planning within newly defined programs such as the Air Quality Maintenance Area Program will identify term projections.

1974 Emission Inventory

The Minnesota Air Quality Emission Inventory was reviewed to extract emission information for Cook, Lake and St. Louis Counties. The emission inventory gives annual concentrations of total suspended particulates, sulfur oxides, carbon monoxide, hydrocarbons, nitrogen oxides and potential total suspended particulates for stationary (versus mobile) sources.

Table 1 gives the total county emissions for the above-named pollutants. The emission inventory generally considers only those sources of emission in excess of 100 tons per year, so there is the possibility that small emission sources are not tabulated.

A reflection of the Coastal Area emissions is given in Table II. Note that all major emissions for each pollutant in Lake County are emitted in the Coastal Area. This information merely reflects the magnitude of the taconite processing operation at Silver Bay.

Table II shows that only 12% of all particulates are emitted in the St. Louis Coastal Area (Duluth). In addition, 41% of all sulfur oxides, 25% of all carbon monoxide, 83% of all hydrocarbons and 25% of all nitrogen oxides emitted in St. Louis County are emitted in the Coastal Area (Duluth). The bulk of particulate, sulfur oxide, carbon monoxide and nitrogen oxide emissions within St. Louis County are emitted by inland taconite processing plants. On the other hand, the bulk of hydrocarbons are emitted in Duluth, reflecting mobile and stationary source emissions.

TABLE I

TOTAL EMISSIONS

County	Actual Particulate Tons/Year	SO_x Tons/Yr.	CO Tons/Yr.	HC Tons/Yr.	NO_x Tons/Yr.	Potential Particulate
Cook	4,934	20,542	273	82	4,914	---
Lake	23,997	1,789	179	88	2,208	30,247
St. Louis	38,113	17,986	3,696	2,542	8,579	1,293,593

TABLE II

COASTAL AREA EMISSIONS

County	Actual Particulate Tons/Year	SO_x Tons/Yr.	CO Tons/Yr.	HC Tons/Yr.	NO_x Tons/Yr.	Potential Particulate
Cook	4,934	20,542	273	82	4,914	---
Lake	23,997	1,780	179	88	2,208	30,247
St. Louis	44,405	7,304	940	2,137	2,184	88,744

It should be noted here that emissions from Wisconsin (Superior) and nearby Cloquet are not considered in this report, but the effect upon air quality from these additional emissions is inseparable from the total air quality problems.

It should also be observed that the potential particulate which could be emitted in St. Louis County is 30 times greater than the actual emission in St. Louis County. This fact reflects the impact of planned or proposed taconite expansion.

1974 Air Quality Data

Air quality data taken for 1974 in the Coastal Zone exists only for Duluth proper (Superior data available from the State of Wisconsin). No data was taken by the state in the Coastal Zone for Cook or Lake Counties.

Air quality was exceedingly good in Duluth for 1974, with only air quality standards for particulate matter being exceeded. Data was taken only for total suspended particulates, sulfur dioxide and nitrogen dioxide; however, additional assessments for carbon monoxide and photochemical oxidants will be made in 1975 since there have been indications of standards being exceeded for those two pollutants.

Table III gives 1974 air quality data for Duluth air monitoring sites.

"Secondary"*** total suspended particulate standards were exceeded at several locations. Although standards were exceeded, many locations throughout the state and nation had secondary standards exceeded.

*** "Secondary" refers to standards designed to protect vegetation, fish, wildlife, esthetics, etc. as opposed to "Primary" standards, which are directed to protect human health.

TABLE III

ST. LOUIS COUNTY - (DULUTH) AIR QUALITY DATA

State Site No.	Particulate - Micrograms per Cubic Meter: Annual Geom. Mean	Particulate - Micrograms per Cubic Meter: 2nd High 24-hour	SO_2 - parts per million: Annual Mean	SO_2 - parts per million: 2nd High 24-hour	NO_2 - parts per million: Annual Mean
7501	44.8	185**	.005	.017	----
7502	34.6	156**	----	----	----
7503	67.1*	229**	.007	.025	.025
7504	60.8*	195**	.008	.032	.028
7505	51.1	152**	----	----	----
7506	17.2	67	----	----	----
7512	48.3	163**	----	----	----
7521	55.4	230**	----	----	----

* Exceeds secondary annual standard of 60 micrograms per cubic meter

** Exceeds secondary 24-hour standard of 150 micrograms per cubic meter

Future Planning Strategies

From existing data, several salent factors have surfaced relative to the North Shore Coastal Zone: 1) particulate air pollutants are affected by industrial processes in significant amounts since 53% of the total particulate air pollutants are emitted from such sources; 2) it is difficult to predict the degree to which mining operations will affect North Shore air quality; 3) curtailment of steel and cement operations in the region will improve air quality, but the amount that such apparent reductions will be offset by the increase of mining and related operations is currently undeterminable. Future air quality management will have to keep in mind these considerations.

The development of air quality management strategies will include intergovernmental coordination in addition to the following emission control measures: stack height regulations, control of fugitive dust sources, improved energy conservation, revised "SIP"* control measures, fuel conversion, special operating conditions, combination of emission sources, new source performance standards, and phase-out or prohibition of emission sources. Local and regional area-wide land management strategies will include the environmental assessment

* "SIP" means the annual State Implementation Plan.

(environmental impact statement project evaluation) process, "Indirect Source"* review and control, zoning and subdivision application reviews, transportation controls, emission allocation procedures, emission density zoning, emission charges and transfer of emission source location.

Air quality management strategies include air quality standards specifically for the Duluth city limits in addition to other limitations for specific air pollutant characteristics. The non-degradation strategies are incorporated within the Air Quality Maintenance Area's (AQMA's) designated Duluth boundaries for particulates. Due to the unique meteorological conditions in the port area of Duluth and Superior, which share the same "air envelope"; since Superior, Wisconsin is not currently designated as an AQMA; because available methods of calculating future air quality in refined terms for the Duluth-Superior area are desirable but possibly invalid; since appropriate meteorologist inputs are a current problem; and because AQMA process is in its initial planning stages, it is not appropriate at this time to speculate on the specific Duluth-Superior metropolitan air quality non-degradation policy.

Although the AQMA in Minnesota is still in the initial planning stage, the local, county, regional, state and federal Coastal Zone Management efforts may wish to consider developmental opportunities relative to this concept. In essence, urban planning policies must begin to consider the impacts which plans and programs have on air quality. "A Guide for Reducing Air Pollution through Urban Planning"** exemplifies this opportunity.

"Because federal ambient air standards apply to all public areas of all cities, the practice of segregating polluting industries may have to end. The clustering of dirty industries might spare cleaner land uses from industrial smoke, dust, fumes and odors; but clustering can over-tax the ability of one neighborhood's atmosphere to dilute pollutants.

Land use based control strategies in the future could be influenced by emission density zoning procedures. "This regulatory measure assigns specific maximum allowable areal emission rates to different classes of current or potential land use."***

* "Indirect Source" means major (intermittent stationary and/or mobile air pollutant) emittors such as airports, parking lots, shopping centers, sports arenas, recreational areas, etc.

** "A Guide for Reducing Air Pollution through Urban Planning," Alan M. Vorhees & Assoc., Inc., McLean, Virginia; and Ryckman, Edgerley, Tomlinson & Assoc., St. Louis, Missouri; Environmental Protection Agency contract, Research Triangle Park, No. Carolina, October 1973.

*** "The Effect of Air Pollution Control Regulations on Land Use Planning, John J. Roberts, Edward J. Croke and Samuel Booras, Journal of the Air Pollution Control Assoc., Vol. 25, No. 5, p. 507, May 1975.

Sources for all Air Quality section information are from the MPCA, Division of Air Quality, Technical Services Section, September and October 1975.

The permit system (new source and indirect source) combined with the above policies could give the Agency a more effective means of dealing with ambient air pollution in relation to both existing and future development in the North Shore Coastal Zone.

NOISE-RELATED ACTIVITIES

One position is currently designated in the Agency to develop and administer state laws concerning noise pollution abatement throughout Minnesota. Since 1974, the staff has concentrated on transportation-related aspects of noise controls due to the extreme Agency resource limitations.

In the Coastal Zone of Lake Superior, such activities as airport, highway, rail, shipping, mining, industrial and recreational oriented noise sources appear to be major problem areas. The Duluth airport's military training activities, including low-level flights, and potential expansion of existing operations among European and interstate flights are some of the more important flight-related considerations. Highways, both existing and a proposed freeway corridor through Duluth, other major thoroughfares and major congested intersection areas represent surface vehicular traffic noise generators. Mining-related aspects include varying types of noise and structural damage problems associated with blasting, which is not currently controlled by any state agency.

Recreational sources include boats and snowmobiles. Freight-handling activities associated with rails, shipping, elevators and ship horns are other sources of noise. Industrial processes separate from, and combined with, freight-handling trucks, elevators, ships and rails are still other noise sources.

The nature of noise (in the regulations) is characterized by numerous aspects: natural and manmade; day/night; various land activity classifications grouped in four major "noise area classification" categories; decibel levels, including continuous (non-impulsive) or impulsive noise (single or multiple peaks); 10% per hour level of sound exceeded as measured by Agency Director approved test procedures (compared to relevant outdoor background comparison reference sound levels). Other qualifications are included such as the August 25, 1975 motor vehicle noise limit requirements; but staff and related resource appropriations for existing state agencies and inappropriate local requirements or enforcement seem to be the major noise pollution control program obstacles currently.

Perhaps public officials are unaware of the potential benefits of noise regulations. A Minneapolis Tribune article on Monday, September 16, 1974, "Area Residents Prefer Suburban, Country Homes," indicates that a sampling of 604 persons throughout a 5-county area placed "a quiet neighborhood" at the top in response to the question, "Which two or three of these conditions are most important to you when it comes to where you live?" For men, 34% wanted "a quiet neighborhood" first of 17 preferences -- ahead of "good schools," "being close to work," "privacy" and "a crime-free environment." In the 65-and-over category, Senior Citizens also placed the preference for "a quiet neighborhood"

ahead of "good bus service" by 41% and 32% responses, respectively. Similarly, for those earning less than $5,000, the response of 49% cited quiet neighborhoods at the top of the list.

Future noise controls in the Coastal Zone require essentially that NPC-1 and 2 standards must be met. New developments would be subject to identical performance requirements as existing sources of noise pollution, which are categorized within the regulations (mentioned above) as to land use/activity types. However, non-degradation of wilderness, wildlife and other such areas has impacts on Coastal Zone development in addition to minimum requirements; and these should be considered.

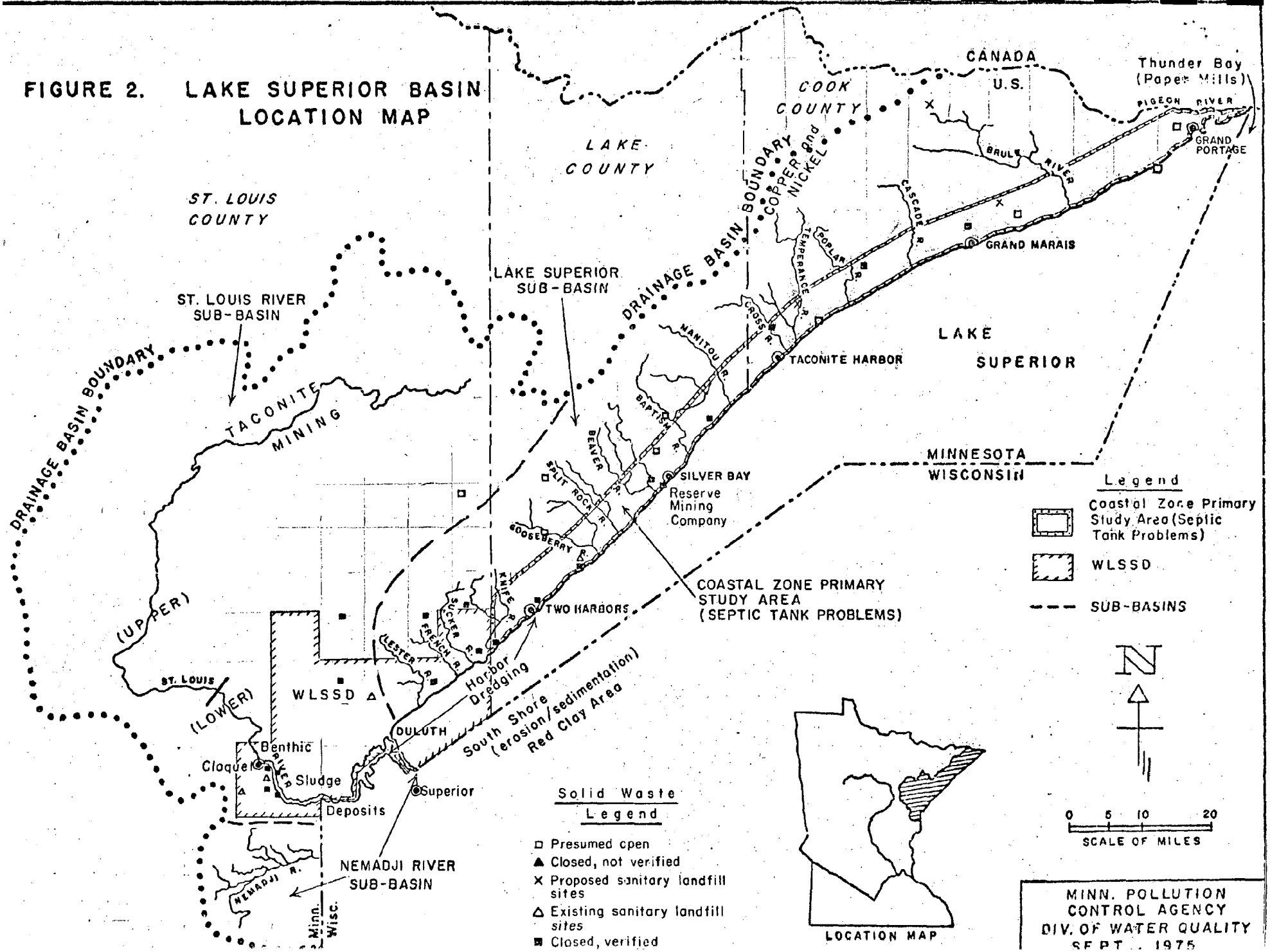
SOLID WASTE RELATED ACTIVITIES

Progress has been made in the past five years to improve solid waste management in the Coastal Zone by cooperation between the MPCA and county governments concerned. As the illustrations show (see Figure 2), phasing out the old open dumps and replacing them with permitted landfills -- either full sanitary landfills or modified landfills requiring less frequent covering of the refuse -- has led the Coastal Zone towards an improved quality of the North Shore.

It has been unofficially estimated that between 50-75 open dumps existed between the Duluth area and Grand Portage in the Minnesota North Shore area in 1970; and since that time, of the total of 35 known dumps that have been identified in the Coastal Zone area, 11 are presumed still open, 18 are closed and verified, two are proposed landfill sites, and four have been upgraded to permitted sanitary landfills. All 35 are within the Coastal Zone "primary planning area" (five miles inland) from the Duluth area to Grand Portage. The Western Lake Superior Sanitary District solid waste management system includes two sanitary landfill sites in the Carlton County portion and one in the Duluth (St. Louis County) area; one additional sanitary landfill exists in Lake County, while Cook County still does not have a permitted sanitary landfill. Cook has three dumps verified as closed, with four still presumed open. Six dumps are presumed open for Lake County, which has five others verified as closed. Ten of the 18 total dumps verified as closed in the Coastal Zone are within the WLSSD area. In addition, four disposal sites within the Coastal Zone Primary Study Area (within five miles of the shoreline) are currently anticipated to be developed during the next two years: WLSSD-Duluth Solid Waste Processing Facility and Western Demolition Landfill areas in St. Louis County, and Maple Hill and Tofte Sanitary Landfill sites in Cook County.

Advantages to the North Shore region from the landfill permit program are: consolidating solid wastes to limited, confined areas; better identification of the nature, scale and characteristics of such wastes; control of access to the sites to allow regulation of which waste materials are deposited there; monitoring of operations and potential leachates to prevent water quality degradation; elimination of open burning among otherwise numerous, scattered sites, thus protecting air quality; minimized (insect, rodent and other animal) disease-spreading activities; and improved esthetics per visual and odor characteristics. Economic problems of sanitary landfills caused by distant locations,

FIGURE 2. LAKE SUPERIOR BASIN LOCATION MAP



low-density populations, the greatly increased cost of a sanitary landfill in comparison to an open dump, and high tourist uses during winter and summer peak seasons are being scrutinized now.

The Western Lake Superior Sanitary District, which directs regional metropolitan wastewater and solid waste management in the Cloquet-Duluth area (similar to the Twin Cities Metro Waste Control Commission), has been concerned with adequate energy sources' availability for drying solid waste sludge produced as a result of current wastewater treatment techniques. The current energy shortage has emphasized this concern. Feasibility studies have indicated the probability of a combination of using solid waste as fuel to incinerate the sludge with resources energy recovery to satisfy economic and environmental concerns.

Besides energy problems, the solid waste source reduction approach, including state packaging laws to reduce unnecessary environmentally harmful or energy-wasteful packaging, poses the problem of "resource recovery vs. source reduction" issues since the public sector has not yet guaranteed a market for recycling schemes. A stable market is the critical element. For example, in the abandoned automobile recycling program -- largely a success in the Costal Zone counties -- fluctuating local, regional and international salvage markets might easily place burdens on the system's potential advantages. Similarly, glass, copper, paper and other recoverables are impacted by specific market situations.

The Abandoned Motor Vehicle Program has collected approximately 5,600 vehicles, including transportation to scrap processors, in the following North Shore counties: Cook - 1,000; St. Louis - 4,000; Carlton - 600. Lake County has taken inventory of the number and location of junk cars although none have yet been collected or transported to the processors.

Another solid waste program affecting Costal Zone counties is the animal/livestock feedlot-permitting program. State-wide, feedlots are much more prolific than they are in the North Shore region; but estimates indicate that approximately 1,030 feedlots exist in the four counties, of which 23 are permitted. The following relatively small number of scattered permitted feedlots exist in the Coastal Zone (estimates of the total number of feedlots are indicated in parentheses). St. Louis has seven permitted feedlots (500); Carlton has 16 permitted (500); Cook has none permitted (5); and Lake has none permitted (25). Only Carlton County is participating in the state-county feedlot permit processing program, and dairy cattle are the predominant type of operation permitted; however, only the northwest portion of Carlton County is within the WLSSD boundaries, which are considered part of the Coastal Zone area (although the entire eastern part of the county is within the Lake Superior Basin). St. Louis County's permitted feedlot operations include dairy or beef cattle. Although all livestock feedlots are permitted by the Agency's Division of Solid Waste and Minnesota counties, feedlots with more than 1,000 animal units or feedlots considered to be significant water quality problems are considered "point sources" by the Division of Water Quality and must have a NPDES (National Pollutant Discharge Elimination Discharge Elimination System) permit.

The future of Minnesota's solid waste program will see the revision of sanitary landfill technical requirements to prevent leachate and methane gas problems, and the adoption of disposal standards for special wastes such as toxic and hazardous wastes, industrial sludges, demolition and construction wastes, diseased trees, fly ash and foundry sand. The future will also bring increased resource recovery activity with evaluation of such solid waste disposal options as incineration with energy recovery, recycling and source reduction. Each option investigated will involve weighing the relative effects on air, water, land, energy economics and other resources.

In summary, the Coastal Zone has made strides from the old situation of uncontrolled open-burning dumps towards an environmentally sound solid waste management program. During the 1970 to 1975 period, the region has been in a transition stage from minimal activity to more positive actions directed toward solid wastes inventory, assessment, demonstration projects and alternatives selection. Any assessment of the effect of solid waste disposal on the environment might be in terms of overall program outputs such as the number of 1970 open dumps, the number closed; the elimination of related hazards and nuisances (disease, odor, incineration, site destruction from uncontrolled access to numerous dumps, etc.); the number of modified landfills and sanitary landfill sites opened, and improved performance; recycling efforts, including the number of abandoned motor vehicles collected and transported; the number and type of studies conducted; and public awareness and management preferences.

Solid Waste's related management strategies will continue to eliminate disposal sites located in shoreland zones. The first phase of protecting human health from disease from rodents and air quality degradation from open burning is almost complete. A second phase is underway to continue replacement of numerous scattered dumps by fewer sites, properly operated, and to introduce resource recovery as a potential alternative to disposal. Landfill operations which have problems concerning groundwater or surface water contamination from recently required monitoring must be improved if the water pollution potential is considered significant. Sites will be fewer and larger landfill operations located near current and future population concentrations, and selected operations will be eliminated or reduced in scale due to potential future technology, legislation or environmental research. A final phase of special wastes handling will address hazardous wastes, sludge disposal and other such considerations, and their relationship to a central resource recovery site in Duluth.

LAND-RELATED ACTIVITIES

Examples of Land-Related Activities

Land-related elements of the Coastal Zone environment are inseparable from air, water, solid wastes and other elements in practical and ultimate terms. Some examples should identify the nature of environmental pollutants which impact various aspects of land, air, solid wastes,

etc. The Reserve Mining Company's Silver Bay plant has emitted up to 100 tons of total suspended particulate matter to the air daily. Nearly 700 times that amount (69,000 tons per day) of taconite tailings are discharged in the wastewater effluent to Lake Superior. If either of the wastes were removed from the air or the water before, during or after discharge, the residuals would be considered a solid waste. If the currently proposed Mile Post Number 7 site is eventually accepted for on-land tailings disposal, this land use would accommodate one of the 30 largest structures in the world in terms of land area for all the facilities. U.S. Steel's Duluth coke plant daily discharges raw sewage, 5,000 pounds of ammonia and 800 pounds of cyanide to the St. Louis River, and particulate matter into the air.

Land-based electrical power plants have similar air and water-related aspects. If coal-powered to create steam for electric generation, such a plant could have a solid waste type of problem as well due to the disposal of the fly ash residual. Nuclear power plants' potential radiation hazards are still another consideration.

Sludge removed from wastewater treatment facilities (lagoons and plants) is a wastewater and solid waste problem -- then at the point of burning becomes an air quality problem.

Iron removal as a result of processes at a water supply treatment facility has similar water and solid waste implications.

Leaching, percolation or seeping of chemicals, poisons, and toxic or hazardous substances from city dumps or landfills improperly operated, or a dump situated in a low area with a high water table becomes a water quality problem after reaching underground or surface waters. An aquifer, lake, stream or river might be contaminated unless a properly situated and operated sanitary landfill eliminates or minimizes such water quality degradation.

Several proposed boat marina/refuge harbor projects have potential land, water, solid waste and other environmental impacts in addition to gainful employment and other development objectives. Public expenditures for solid waste, sewerage, dredging and access facilities, in addition to multiple impacts on the Coastal Zone's environment and initial economic impacts, should be considered to properly evaluate comprehensive resource management impacts.

Comprehensive Environmental Resource Management

Environmental strategies in standards and regulations are currently separated into manageable sectors of water, air and noise, and solid waste in the MPCA. The Minnesota Department of Health and MPCA currently share state-wide responsibility for the control of septic tanks, and the Department of Natural Resources also has responsibility relating to shoreland and floodplain areas management. There is inter-agency coordination among federal, federal-state, regional, and local special and general-purpose governments which potentially impact Coastal Zone development, resource management, and environmental protection and preservation, including the National Environmental Protection Act, Federal

Water Pollution Control Act Amendments of 1972, Minnesota Environmental Policy Act, Coastal Zone Management Act and others. Essentially, however, water quality strategies call for concentrating development according to transportation patterns which, in turn, allow access for development. Water and sewerage needs are integral components here. Air quality in the future has a leadership role, as do circulation patterns, water quality strategies and noise. Solid waste appears to follow development rather than lead it in terms of critical, comprehensive resource management impacts. Local, regional, state and federal levels of government must somehow be more effective in coordinating and implementing these strategies.

APPENDIX

ATTACHMENT A

POLLUTION CONTROL AGENCY
WORK PROGRAM
FISCAL YEAR 76

1. Prepare status report on the EPA water quality monitoring study for 17 streams in the Lake Superior Basin and four Municipal sewage plants:

1. Baptism River
2. Beaver River
3. Brule River
4. Cascade River
5. Crow River
6. French River
7. Gooseberry River
8. Knife River
9. Lester River
10. Manitou River
11. Nemadji River
12. Pigeon River
13. Popular River
14. Lower St. Louis River
15. Split-Rock River
16. Sucker River
17. Temperance River

Sewage Treatment Plants

1. Grand Marais
2. Silver Bay
3. Duluth
4. Two Harbors

2. General assessment in narrative form of the quality of the water, air, and land in the Coastal Zone and the impact of future development on these factors.

3. Provide information in draft form concerning future plans of the PCA as they relate to existing and potential sanitary districts and regional wastewater treatment strategies, the design, construction, installation, and operation of conventional and experimental soil absorption units, solid waste disposal and noise pollution abatement.

4. In narrative describe how existing PCA and federal standards and regulations affect both existing and future development in the Coastal Zone i.e., in relation to standards, where should new development occur; where not; where are existing problem areas.

5. Prepare final report which incorporates drafts of work elements 1-4.

Timing and Cost of Work Elements Fiscal Year 76

a. Prepare draft narratives of the following work elements:
   1. Work element 1 and 2 by August 31 — $2,500
   2. Work element 3 by September 15 — 1,200
   3. Work element 4 by September 30 — 1,200
b. Prepare 30 copies of final report which incorporates drafts in work elements 1-4 by October 15. — 300

ATTACHMENT B

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ATTACHMENT C

MINNESOTA POLLUTION CONTROL AGENCY
Division of Water Quality

Memorandum on Proposal for Contract
with U. S. Environmental Protection Agency
for Sampling of Tributaries to Lake Superior

June 8, 1973

This proposed contract is to provide for monthly sampling of all major streams tributary to Lake Superior in Minnesota. Attachment A is a "Procurement Request/Requisition" with a "Statement of Work".

The proposed contract will basically provide for:

1. Sampling of the 17 tributaries 15 times during a period of one year.
2. Eighteen months to complete the project, including the final report.
3. Monthly report to EPA.
4. Contract cost of $43,125.

This contract, according to EPA, must be approved by both EPA and PCA before June 30, 1973 or the funds will cancel.

In addition to forming an important part of Upper Great Lakes Study, this program will provide valuable information for our own water quality program which we would otherwise be unable to obtain.

It is recommended that the Agency approve the proposed contract.

John F. McGuire, Chief
Section of Standards & Surveys

LAKE SUPERIOR TRIBUTARIES STATION LIST

Agency Number for Tributaries = 21MINN Station type = 02111204

Stream	Coordinates	Primary STORET No.	Secondary STORET No.	Description
Nemadji	(46-31-04) (92-23-21)	LSNE--8---17E67	NE-8	SH-23 bridge crossing near Wrenshall on upstream side
St. Louis River	(46-40-36) (92-12-09)	014	SL-4	SH-39 bridge crossing at Oliver on upstream side (abandoned 12/73 in favor of SLB-1)
St. Louis Bay	(46-37-00) (92-06-02)	030	SLB-1	Beneath I-535 bridge, Superior Wisconsin
Lester	(46-49-45) (92-00-25)	015	LE-0	100' upstream of foot bridge at Lester Park, Duluth
French	(46-54-06) (91-53-30)	016	FR-0.1	100' above USH-61 bridge at French River Hatchery
Sucker	(46-55-22) (91-50-54)	017	SUC-0.2	USH-61 bridge near Palmers on downstream side
Knife	(46-57-03) (91-46-48)	018	KN-0.2	500' upstream of USH-61 bridge at Knife River
Gooseberry	(47-08-24) (91-27-24)	019	GR-1	100' downstream of USH-61 bridge near Castle Danger
Split Rock	(47-10-52) (91-24-21)	020	SPL-0.1	500' upstream of USH-61 bridge 1 mi. so. of Split Rock Point
Beaver	(47-15-83) (91-16-66)	021	BV-0	1½ mi. sw. on CSAH 3 from junction of CSAH 4, 1½ mi. no. of Beaver Bay
Baptism	(47-20-00) (91-12-00)	022	BP-0	USH-61 bridge 2 mi. so. of Illegen City on upstream side
Manitou	(47-26-33) (91-04-12)	023	MAN-1	USH-61 bridge 3 mi. no. of Little Marais on downstream side
Temperance	(47-37-00) (90-56-66)	024	TEM-1	Maple Leaf Drive (NFD) bridge off the Sawbill Trail 5 mi. no. of Tofte on upstream side

LAKE SUPERIOR TRIBUTARIES STATION LIST
cont.

Stream	Coordinates	Primary STORET No.	Secondary STORET No.	Description
Cross	(47-32-39) (90-53-48)	025	CRS-0.5	500' upstream of USH-61 bridge at Schroeder
Poplar	(47-38-07) (90-42-24)	026	POP-0	Upper Lutsen Lodge bridge on downstream side at Lutsen
Cascade	(47-40-26) (90-31-30)	027	CAS-0	USH-61 bridge 10 mi. SW of Grand Marais on upstream side
Brule	(47-49-12) (90-03-03)	028	BRU-0.4	USH-61 bridge 4 mi. sw of Hovland on downstream side
Pigeon	(48-00-44) (89-36-58)	029	PIG-9.5	Middle Falls on the Pigeon River 2.5 miles from USH-61 International bridge on Ontario Highway 593 (bank samples above falls)
		WASTEWATER TREATMENT PLANTS		
	Agency Number for STP's = 21MINNS		Station type for STP's = 2244440	
Two Harbors	(47-00-38) (91-39-56)	0206	TH-STP	Two Harbors sewage treatment plant, Two Harbors, Minnesota
Silver Bay	(47-17-32) (91-14-58)	0207	SB-STP	Silver Bay sewage treatment plant, Silver Bay, Minnesota
Taconite Harbor	(47-30-52) (90-56-19)	0208	TACH-STP	Taconite Harbor sewage treatment plant, Taconite Harbor, Minnesota
Grand Marais	(47-46-40) (90-19-52)	0209	GM-STP	Grand Marais Sewage treatment plant, Grand Marais, Minnesota

PROCUREMENT REQUEST/REQUISITION | DATE | | PAGE 1 OF 4

1. ORIGINATOR (Name)	2. TELEPHONE NO.	3. ACCOUNTING SYMBOLS
Carlysle Pemberton, Jr. Great Lakes Coordinator	312- 353-5098	Appr. #: 68X0108 Acc. #: 315505HADO

4. DELIVER TO	5. DATE REQUIRED	6. PROJECT NO.	7. TOTAL ESTIMATED COST
EPA, Region V 1 No. Wacker Drive Chicago, Ill. 60606			$43,125.00
	8. PROJECT OFFICER-MANAGER		9. PHONE NO.

10. STOCK OR ITEM NO.	11. DESCRIPTION	12. QUANTITY	13. UNIT OF ISSUE	14. UNIT COST	15. AMOUNT
	Contract for Additional Sampling and Analyses of Minnesota Tributaries to Lake Superior. 255 samples on 17 tributaries 5,967 analyses Data evaluation and report See attached Statement of Work. (Justification statement also attached.)	1 year			$43,125.00

16. SUGGESTED SOURCES	17. RECOMMENDED PROCUREMENT METHOD
Minnesota Pollution Control Agency 717 Delaware St., S.E. Minneapolis, Minn. 55440 Attn: Grant J. Merritt, Executive Director	☐ COMPETITIVE ☒ NON-COMPETITIVE (Justification attached)

18. SIGNATURE OF ORIGINATOR	DATE
	4/27/73

19. ACCOUNTABLE PROPERTY	NOT AVAILABLE FROM EXCESS	20. SIG OF PROP MGT OFFICER/DESIGNEE	DATE
☐ INITIALS ____	☐ INITIALS ____		

21. APPROVALS

A. BRANCH/OFFICE	DATE	D. OTHER	DATE
B. DIVISION/OFFICE Great Lakes Coordinator	DATE 4/27/73	E. ASSISTANT ADMINISTRATOR	DATE
C. FUNDS LISTED IN ITEM 7 ARE AVAILABLE AND RESERVED	DATE	F. OFFICE OF THE ADMINISTRATOR	DATE

FOR PROCUREMENT OFFICE ONLY

INVITATION NO.	CONTRACT NO.	TIME FOR DELIVERY	DISCOUNT TERMS
F.O.B. POINT	SHIP VIA	REFER INQUIRIES CONCERNING THIS REQUEST TO (Procurement contact)	TELEPHONE NO.

EPA Form 1900-8 (10/71)

DISTRIBUTION:
ORIGINAL - PURCHASE FILE
COPY 1 - COMMITMENT FILE
COPY 2 - PROPERTY MANAGEMENT OFFICER
COPY 3 - RETURN TO ORIGINATOR
COPY 4 - RETAIN BY ORIGINATOR

REPLACES FWQA 2065-2 (8-70) WHICH IS OBSOLETE.

STATEMENT OF WORK

The purpose of this contract is to determine the constituent loadings to Lake Superior from Minnesota tributaries to satisfy the needs of the IJC Upper Lakes Pollution Study.

The proposed work would include collection and analysis of samples from the following 17 north shore tributaries not now included in the state tributary monitoring program:

1. Nemadji R.
2. St. Louis R.*
3. Lester R.
4. French R.
5. Sucker R.
6. Knife R.
7. Gooseberry R.
8. Split Rock R.
9. Beaver R.
10. Baptism R.
11. Manitou R.
12. Cross R.
13. Temperance R.
14. Poplar R.
15. Cascade R.
16. Brule R.
17. Pigeon R.

*The St.Louis R. is now sampled by the state. However, it will be necessary to establish an additional sampling station in a different location for the purpose of the Upper Lakes Study.

It is proposed to sample these tributaries 15 times per year and analyze all samples for the parameters listed on Table 1. Flow data will be obtained for those streams where the data are not otherwise available. In addition, samples will be analyzed three times a year for the parameters shown in Table 2.

Tables 1 and 2 are taken from the approved Study Plan for the IJC Upper Lakes Pollution Study, and represent the minimum program agreed to by those participating in the Study.

New Monitoring Stations:

No. of Stations	X	Parameters	X	Frequency	=	Additional Analyses/year
17		18		15		4,590
17		27		3		1,377
						5,967

Estimated Cost:

5,610 samples @ $2.50	$14,025
357 samples @ $20.00 (radioactivity,pesticides)	7,140
Salary	14,000
Travel	3,800
Shipment of samples	3,000
Equipment	1,160
Total	$43,125

The program additions described above will result in the annual collection of 255 additional samples from 17 tributaries, and the performance of 5,967 analyses on those samples.

The resulting data will be entered into the Federal STORET system by Minnesota. In addition, the state will provide evaluation of the data, including computation of annual constituent loadings, and produce such reports as the Upper Lakes Study requires. The cost of the proposed work is $43,125.00 and the work is to be completed by December 31, 1974. This contract is for one year of sample collection and the required analyses, data evaluation and reporting. It is expected that the contract will be extended for a second year, contingent on availability of appropriated funds.

March 28, 1973

Mr. Carlysle Pemberton, Jr.
U. S. Environmental Protection Agency
Region V
One North Wacker Drive
Chicago, Illinois 60606

Dear Mr. Pemberton:

This will confirm our cost estimates for additional tributary sampling in connection with providing federal funds to assist the states in implementing tributary sampling for the Upper Great Lakes Study.

These figures are based on sampling 17 north shore tributaries as follows:

NE	Nemadji River*	BAP	Baptism River
SL	St. Louis River	MAN	Manitou River
LES	Lester River	CRS	Cross River
FR	French River	TEM	Temperance River
SKR	Sucker River	POP	Poplar River
KN	Knife River	CAS	Cascade River
GBK	Gooseberry River	BRU	Brule River
SPL	Split Rock River	PIG	Pigeon River
BVR	Beaver River		

*Nemadji River rises in Minnesota, but enters the lake in Wisconsin. We propose to sample at the Minnesota-Wisconsin line only.

Analytical Costs

The parameters listed in Appendix A of the Upper Great Lakes Study report are divided into two calsses, i.e., monthly sampling of 19 parameters and sampling for 27 additional parameters, 3 times annually.

Our analytical cost for the monthly parameters is estimated to be $2.50 per parameter; or

17 x 19 x 12 x $2.50	=	$ 9,690

Our analytical costs for 20 of the tri-annual parameters is also $2.50 per parameter; or

17 x 20 x 3 x $2.50	=	2,550

Our analytical costs for gross beta, tritium, strontium, radium, pesticide, chlorinated hydrocarbons and PCB's is $20.00 per parameter; or

17 x 7 x 3 x $20.00	=	8,340

Further, we estimate an additional analytical cost for sampling during high flows of $2,000 — 2,000

TOTAL ANALYTICAL COSTS — $22,580

Salary Costs

We propose to hire one Pollution Control Specialist II, full time and one Pollution Control Specialist I, part time.

Salary and contributions for these positions are as follows:

Pollution Control Specialist II (full time)	$10,000
Pollution Control Specialist I (part time)	4,000
TOTAL SALARY COSTS	$14,000

Expenses

The following additional expenses will be necessary to support the program.

Automobile	@ $2,000/year	$ 2,000
Personal expenses	@ $150/month	1,800
Shipping samples	300 samples/year @$10.00	3,000
Shipping cases with ice chest	20 @ $48.00	960
Two liter bottles	40 @ $5.00	200
TOTAL ADDITIONAL EXPENSES		$ 7,960
G R AND T O T A L		$44,540

With the exception of the last two items, i.e: shipping cases and bottles then costs represent annual costs for the program.

emberton
28, 1973
3

Please advise if we can provide further information.

Yours very truly,

L. E. RICHIE, Assistant Director
Division of Water Quality

GJM
JFM
LER
Pegors - Duluth

C.11.1

MINNESOTA POLLUTION CONTROL AGENCY
1935 W. County Road B2, / Roseville, Minnesota 55113

(612) 296 7256
June 10, 1974

Mr. John Holmgren
Washington Contract Operations
U. S. Environmental Protection Agency
Room 700
Crystal Mall Building No. 2
Washington, D.C. 20460

Dear Mr. Holmgren:

Enclosed is a Contract Pricing Proposal and Statement of Work for additional sampling and analyses of Minnesota tributaries and municipal point sources to Lake Superior, and the preparation of a final draft report. This is a continuation of Contract No. 68-01-1878.

Copies of this material are being sent to Dr. Robert W. Zeller, Director, Surveillance and Analysis Division, Region V, and to Mr. Clarence C. Oster, Acting Director, Minnesota-Wisconsin District Office.

Please advise us if we can provide further information.

Sincerely yours,

Lewis C. Barbe

Lewis C. Barbe, Director
Division of Water Quality

Enclosures
cc: Dr. Robert W. Zeller
Mr. Clarence C. Oster

CONTRACT PRICING PROPOSAL
(RESEARCH AND DEVELOPMENT)

Office of Management and Budget Approval No. 29-R0184

This form is for use when (a) submission of cost or pricing data (see FPR 1-1.807-4) is required and (b) substitution for the Optional Form 59 is authorized by the contracting officer.

PAGE NO. | NO. OF PAGES

NAME OF OFFEROR: Minnesota Pollution Control Agency

HOME OFFICE ADDRESS: 935 West County Road B2, Roseville, Minnesota 55113

SUPPLIES AND/OR SERVICES TO BE FURNISHED: Determine constituent loadings to Lake Superior from tributaries and municipal point sources in Minnesota.

DIVISION(S) AND LOCATION(S) WHERE WORK IS TO BE PERFORMED: Division of Water Quality, Roseville

TOTAL AMOUNT OF PROPOSED: $

GOV'T SOLICITATION NO.

DETAIL DESCRIPTION OF COST ELEMENTS

			EST COST ($)	TOTAL EST COST	REFERENCE
1. DIRECT MATERIAL (Itemize on Exhibit A)					
a. PURCHASED PARTS					
b. SUBCONTRACTED ITEMS					
c. OTHER—(1) RAW MATERIAL					
(2) YOUR STANDARD COMMERCIAL ITEMS					
(3) INTERDIVISIONAL TRANSFERS (At other than cost)					
TOTAL DIRECT MATERIAL					
2. MATERIAL OVERHEAD (Rate % X $ base =)					
3. DIRECT LABOR (Specify)	ESTIMATED HOURS	RATE/HOUR	EST COST ($)		
(2) Pollution Control Specialist II	2 man yrs		21,375		
(1) Pollution Control Specialist III	200 hrs	6.47/hr	1,255		
(1) Clerk Typist	100 hrs	3.05/hr	305		
TOTAL DIRECT LABOR				22,975	
4. LABOR OVERHEAD (Specify Departments or Cost Centers)	O.H. RATE	X BASE =	EST COST ($)		
TOTAL LABOR OVERHEAD					
5. SPECIAL TESTING (Including field work at Government installations)			EST COST ($)		
Laboratory Analytical Costs			17,997		
TOTAL SPECIAL TESTING				17,997	
6. SPECIAL EQUIPMENT (If direct charge) (Itemize on Exhibit A)					
7. TRAVEL (If direct charge) (Give details on attached Schedule)			EST COST ($)		
a. TRANSPORTATION			2,200		
b. PER DIEM OR SUBSISTENCE			2,100		
TOTAL TRAVEL				4,300	
8. CONSULTANTS (Identify—purpose—rate)			EST COST ($)	~~3,000~~	
TOTAL CONSULTANTS					
9. OTHER DIRECT COSTS (Itemize on Exhibit A)				1,290	
10. TOTAL DIRECT COST AND OVERHEAD				46,562	
11. GENERAL AND ADMINISTRATIVE EXPENSE (Rate 10 % of cost element No. 3,4,7,9)				4,656	
12. ROYALTIES*					
13. TOTAL ESTIMATED COST				51,218	
14. FEE OR PROFIT					
15. TOTAL ESTIMATED COST AND FEE OR PROFIT				51,218	

OPTIONAL FORM 60
October 1971
General Services Administration
FPR 1-16.806

proposal is submitted for use in connection with and in response to *(Describe RFP, etc.)*

reflects our best estimates as of this date, in accordance with the Instructions to Offerors and the Footnotes which follow.

TYPED NAME AND TITLE	SIGNATURE
L. E. Richie, Assistant Director Division of Water Quality	
NAME OF FIRM Minnesota Pollution Control Agency	DATE OF SUBMISSION

EXHIBIT A—SUPPORTING SCHEDULE *(Specify. If more space is needed, use reverse)*

COST EL NO.	ITEM DESCRIPTION *(See footnote 5)*	EST COST (5)
	Sample Shipment	990.00
	Miscellaneous	300.00

I. HAS ANY EXECUTIVE AGENCY OF THE UNITED STATES GOVERNMENT PERFORMED ANY REVIEW OF YOUR ACCOUNTS OR RECORDS IN CONNECTION WITH ANY OTHER GOVERNMENT PRIME CONTRACT OR SUBCONTRACT WITHIN THE PAST TWELVE MONTHS?

☐ YES ☒ NO *(If yes, identify below.)*

NAME AND ADDRESS OF REVIEWING OFFICE AND INDIVIDUAL | TELEPHONE NUMBER/EXTENSION

J. WILL YOU REQUIRE THE USE OF ANY GOVERNMENT PROPERTY IN THE PERFORMANCE OF THIS PROPOSED CONTRACT?

☐ YES ☒ NO *(If yes, identify on reverse or separate page)*

K. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT?

☒ YES ☐ NO *(If yes, identify.)*: ☐ ADVANCE PAYMENTS ☒ PROGRESS PAYMENTS OR ☐ GUARANTEED LOANS

L. DO YOU NOW HOLD ANY CONTRACT *(Or do you have any independently financed (IR&D) projects)* FOR THE SAME OR SIMILAR WORK CALLED FOR BY THIS PROPOSED CONTRACT?

☒ YES ☐ NO *(If yes, identify.)*: Sampling and Analysis of Minnesota Tributaries to Lake Superior Contract No. 68-01-1878

M. DOES THIS COST SUMMARY CONFORM WITH THE COST PRINCIPLES SET FORTH IN AGENCY REGULATIONS?

☒ YES ☐ NO *(If no, explain on reverse or separate page)*

See Reverse for Instructions and Footnotes

OPTIONAL FORM 60 (10-71)

STATEMENT OF WORK

The purpose of this contract is to determine the constituent loadings to Lake Superior from point sources in Minnesota, including tributaries and wastewater treatment works, to satisfy the needs of the IJC Upper Lakes Pollution Study. This contract essentially continues the work done under Contract No. 68-01-1678 with additional sampling of wastewater treatment plant effluents.

The proposed work includes collection and analyses of samples from the following 17 north shore tributaries described in the original contract:

1. Nemadji River
2. St. Louis River
3. Lester River
4. French River
5. Sucker River
6. Knife River
7. Gooseberry River
8. Split Rock River
9. Beaver River
10. Baptism River
11. Manitou River
12. Cross River
13. Temperance River
14. Poplar River
15. Cascade River
16. Brule River
17. Pigeon River

Collection and analysis of samples from the following four municipal sewage plant effluents will also be included in the contract:

1. Two Harbors
2. Silver Bay
3. Taconite Harbor
4. Grand Marais

It is proposed to sample the tributaries 15 times per year and analyze all samples for the parameters listed on table 1. Flow data will be obtained for those streams where the data are not otherwise available. In addition, samples will be analyzed 3 times per year for the parameters shown on table 2.

It is proposed to take 24-hour composite samples of the treatment plant effluents 4 times per year and analyze the samples for the parameters listed in table 3. Effluent flow data will be obtained at these sites. In addition, grab samples of the effluents will be taken 8 times a year during the months in which composite samples are not taken. These samples will be analyzed for the parameters shown in table 4.

Tables 1-4 are taken from the 1974/75 Study Plan for the IJC Upper Great Lakes Pollution Study.

Monitoring Stations

No. of Stations	x Parameters	x Frequency	= Analyses/Year
	Tributaries		
17	18	15	4,590
17	27	3	1,377
	Municipal Sources		
4	34	4	544
4	20	8	640
			7,151

Estimated Cost

The program described above will result in the annual collection of 255 samples from 17 tributaries, and the performance of 5,967 analyses on those samples; and the collection of 16 24-hour composite samples and 32 grab samples from 4 municipal point sources and the performance of 1,184 analyses on those samples.

The resulting data will be entered into the Federal STORET system by Minnesota. In addition, the state will provide evaluation of the data, including computation of constituent loadings, and produce a final draft report required by the Upper Lakes Study. The cost of the proposed work is $51,218.00. All sampling and other field work will be completed by June 30, 1975. Preparation and revision of the final draft report will be completed by December 31, 1975. This contract is for one year of sample collection and the required analyses, data evaluation, and reporting. This contract represents a continuation of work done under Contract No. 68-01-1878.

Table 1

Items for routine sampling of tributaries at least monthly, and more frequently during spring runoff:

Microbiological

- total coliform
- fecal coliform

Physical

- flow
- temperature
- pH
- conductivity
- turbitidy
- suspended solids

Chemical

- dissolved oxygen
- phenol
- total iron
- total phosphorus
- ammonia
- total nitrogen
- chloride
- alkalinity
- silica
- manganese
- BOD

Others

As needed, or described in agency programs.

Table 2

Items for sampling at least 3 times per year, for background information:

Radiological

- gross beta
- tritium
- strontium
- radium

Organics

- pesticides
- oil
- chlorinated hydrocarbons
- total organic carbon
- polychlorinated bipehnyls

Metals

- arsenic
- barium
- cadmium
- chromium
- copper
- lead
- mercury
- nickel
- selenium
- zinc
- calcium
- magnesium
- sodium
- potassium

Others

- cyanide
- fluoride
- sulphates
- COD

Table 3

Items for composite sampling of municipal sources conducted quarterly:

Chemical

- 5-day BOD
- hardness
- alkalinity
- total phosphorus
- organic nitrogen
- ammonia nitrogen
- nitrite nitrogen
- nitrate nitrogen
- chloride
- phenols
- sulphate
- silica
- arsenic
- selenium
- selenium
- calcium
- sodium
- potassium
- fluoride

Metals

- copper
- cadmium
- nickel
- zinc
- lead
- mercury
- chromium
- iron
- manganese

Physical

- total solids
- suspended solids
- total dissolved solids
- turbidity
- conductivity

Radiological

- Gross alpha
- Gross beta

Table 4

Items for 8 grab samples per year on municipal sources:

Chemical

- 5-day BOD
- hardness
- alkalinity
- total phosphorus
- organic nitrogen
- ammonia nitrogen
- nitrite nitrogen
- nitrate nitrogen
- chlorides
- calcium
- sodium
- potassium
- fluoride
- silica
- phenols

Physical

- total solids
- suspended solids
- total dissolved solids
- turbidity
- conductivity