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REPORT TO THE CONGRESS



BY THE COMPTROLLER GENERAL
OF THE UNITED STATES

APR 22 1976



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Federal Efforts To Extend Winter Navigation On The Great Lakes And The St. Lawrence Seaway— Status And Problems To Be Resolved

During the 4 years of the program to show feasibility of extending the navigation season, winter traffic has been extended in some of the Great Lakes. Much of the traffic, however, is not a direct result of the program.

Major problems to be resolved before conclusive judgments can be made on the practicability of a permanently extended navigation season on the Great Lakes and the St. Lawrence Seaway are (1) the competing use of the waterways during the winter season by power and navigation interests, (2) a lack of a coordinated plan of action with Canada, and (3) potential environmental damage.

Also the program's preliminary economic analysis does not realistically portray the potential benefits and costs of a permanently extended navigation season program.

GAO 00250

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APRIL 20, 1976



COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-175460

To the President of the Senate and the
Speaker of the House of Representatives

CWO 00001

This report discusses the Federal efforts--including the progress being made and the problems to be resolved--in conducting a program to demonstrate the feasibility of extending winter navigation on the Great Lakes and the St. Lawrence Seaway. The report also recommends certain actions which should be taken before a decision is made on whether extended winter navigation is practicable and economically feasible and whether the program should be made permanent.

We made our review pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

We are sending copies of this report to the Director, Office of Management and Budget; the Secretaries of Defense, the Army, Commerce, and Transportation; and the Administrator, Environmental Protection Agency.

Thomas B. Stairs

Comptroller General
of the United States

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ABBREVIATIONS

EPA	Environmental Protection Agency	<i>AGC00024</i>
GAO	General Accounting Office	<i>CNG-02372</i>
IJC	International Joint Commission	<i>↙</i>
WNB	Winter Navigation Board	

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

FEDERAL EFFORTS TO EXTEND
WINTER NAVIGATION ON THE
GREAT LAKES AND THE
ST. LAWRENCE SEAWAY--
STATUS AND PROBLEMS
TO BE RESOLVED

D I G E S T

AVC00305 Corps.

In 1970 the Congress authorized the Corps of Engineers to demonstrate the feasibility of winter navigation on the Great Lakes-St. Lawrence Seaway system. Commerce on these waterways traditionally was suspended for about 3-1/2 months during the winter because of severe weather.

*inland
waterways*

If technically and economically feasible, extending the navigation season would provide general benefits to the Country and direct benefits to shippers, vessel owners and operators, and ports and terminals. (See p. 1.)

The Corps has not yet passed on the merits of a permanent extended season. This report provides the Congress with an overview of program accomplishments and continuing problems.

Major factors contributing to winter traffic in recent years were a change in the Coast Guard's icebreaking policy and a lack of severe weather. Traffic accomplishments claimed by the Corps have been limited to certain geographical areas, commodities, and shippers, and much of the claimed traffic was not a direct result of demonstration program activities. (See p. 7.) GAO recommends that the Corps reevaluate its procedures for determining program accomplishments. (See p. 12.)

Rec

eval.

Many activities included in the program are funded from participating agencies' regular appropriations. The total of these funds (\$17.8 million) was about three times as much as program funds (\$6.5 million) through fiscal year 1975. The Corps has not provided the Congress with information on total funding. GAO recommends that it do so. (See p. 14.)

Rec

Major problems must be resolved before final judgments can be made on the practicability of extending the winter navigation season. Among these are

- inherent technical and legal difficulties affecting power and navigation interests that must be ironed out,
- the United States and Canada need to better coordinate their plans and programs,
- more study of environmental issues must be done, and
- legal responsibilities for damages resulting from extended season operations must be clarified. (See p. 15.)

Planning
Find.

GAO recommends that the Corps work toward, and establish a timetable for, resolving these problems. Appropriate congressional committees should be informed of the progress made. (See p. 30.)

A Corps preliminary benefit-cost analysis (economic feasibility test) indicated a very favorable ratio (7.1 to 1) with a total investment cost of \$192 million for extending winter navigation, but the analysis contained errors and many unsupported assumptions and conclusions. (See p. 34.)

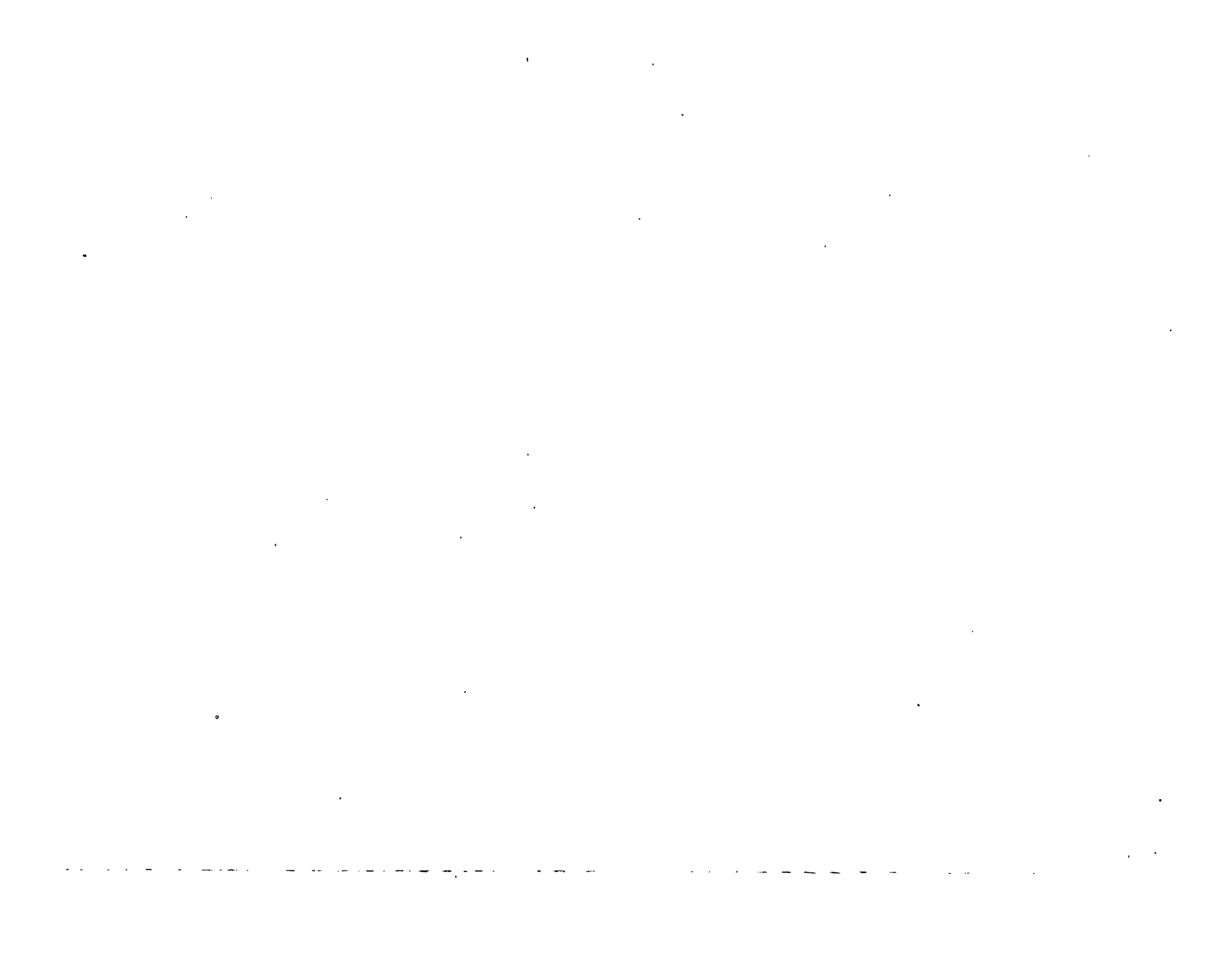
Cargo

For example, benefits for transportation savings included traffic which would occur without an extended navigation season program and were based on inapplicable transportation rates. (See p. 39.) Cost estimates of extended season operations were questionable and might be considerably understated. (See p. 42.)

The Corps recognizes the uncertainties of its preliminary analysis and is working on a re-analysis of the benefit-cost computations. GAO recommends that the Corps' reanalysis include and resolve the questions raised in this report. (See p. 46.)

The Department of the Army said GAO's report was a comprehensive documentation of the demonstration effort and provided a very important objective analysis. (See app. II.)

Agencies concerned generally agreed with GAO's recommendations and indicated that corrective action would be taken. (See pp. 12, 14, 32, and 47.)



CHAPTER 1

INTRODUCTION

The Great Lakes, connecting channels, and the St. Lawrence River form a 2,342-mile waterway from the midcontinent of North America to the Atlantic Ocean. (See maps on pp. 2 and 3.) The availability of low-cost waterborne transportation, along with rich natural resources, has played an important role in stimulating and sustaining economic growth in the area served by this waterway, encompassing many States and Canadian provinces with more than 80 million people and accounting for about 34 percent of the combined gross national product of the United States and Canada.

WINTER NAVIGATION PROGRAM

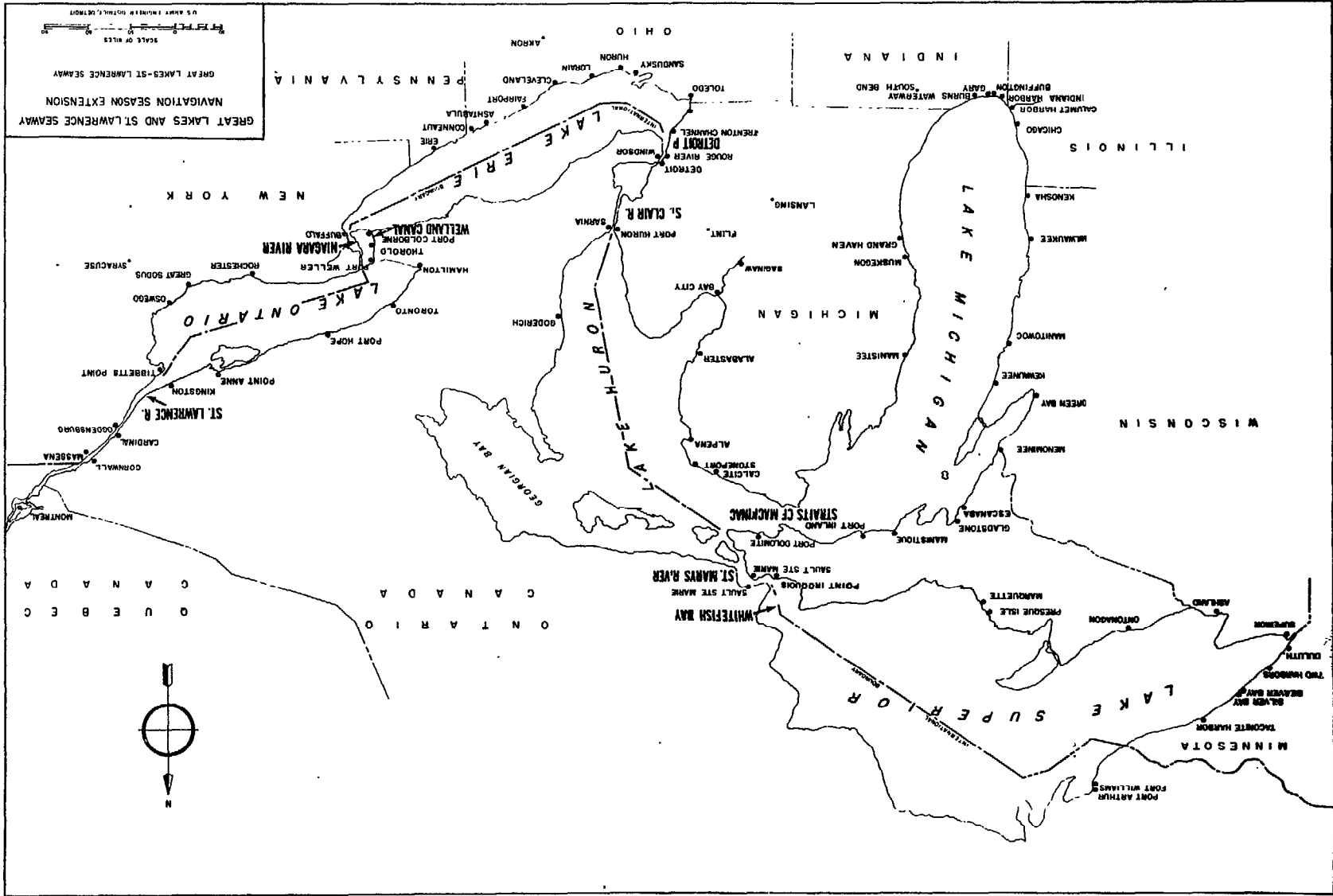
The River and Harbor Act of 1965 (Public Law 89-298, Oct. 27, 1965) authorized the Corps of Engineers to investigate and study means of extending the navigation season on the Great Lakes and the St. Lawrence Seaway. The severity of weather conditions had traditionally suspended interlake commerce on these waterways for about 3-1/2 months during the winter, from December 15 to April 1.¹ If technically and economically feasible, extending the navigation season could provide general benefits to the United States and Canada and direct benefits to shippers, vessel owners and operators, and port and terminal activities.

The problems of extending the navigation season are formidable. They involve curtailing or modifying ice formation, augmenting existing icebreaking capabilities, improving navigation systems, reinforcing vessels engaged in winter traffic, and other measures. Economic and environmental tradeoffs must be considered before determining the feasibility of extending the navigation season.

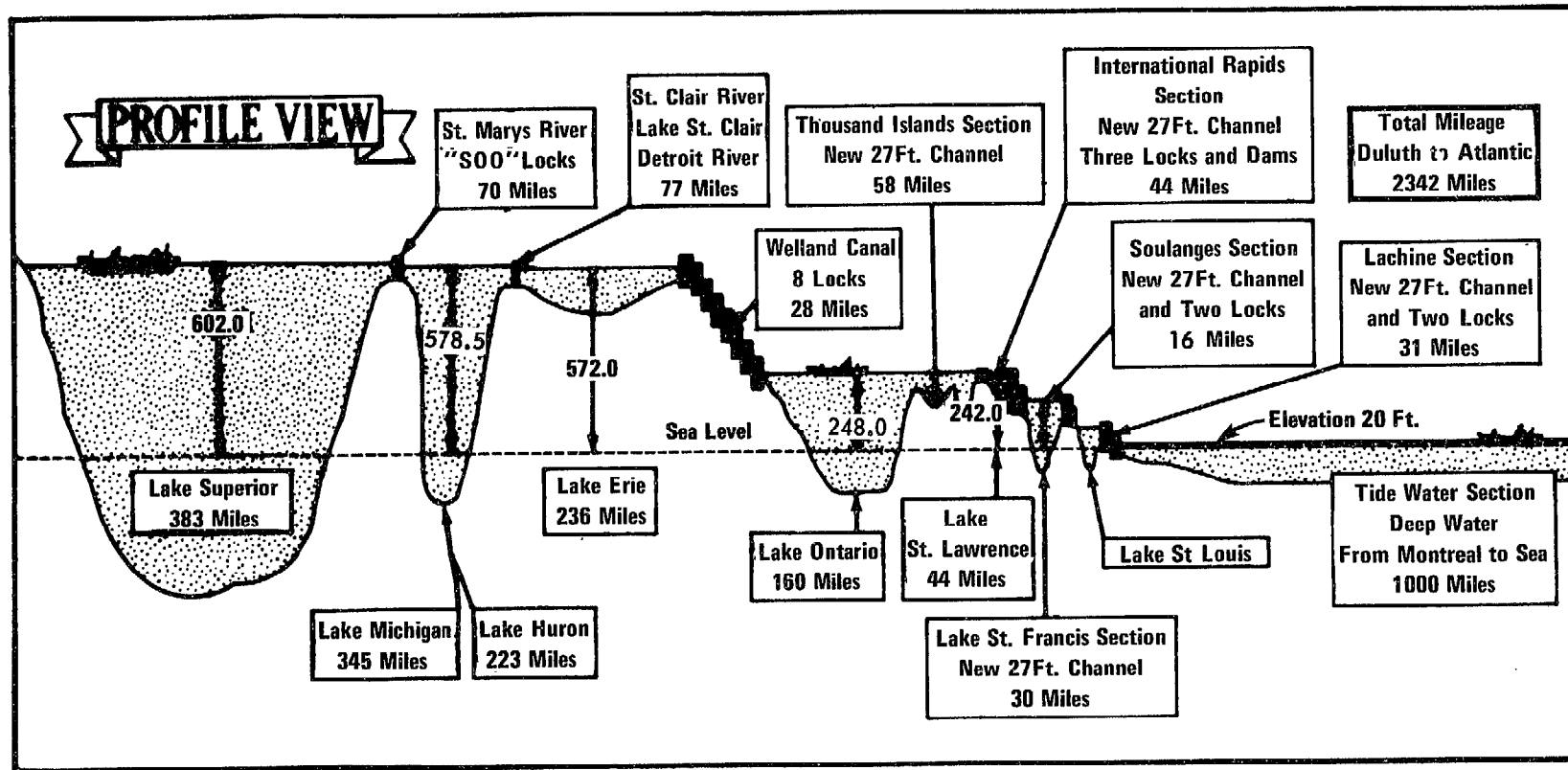
In 1969 the Corps submitted a feasibility report to the Congress which stated that existing technology was advanced enough to consider improvements which might eliminate or overcome the effects of ice and make winter operations physically possible. However, the Corps cautioned against a sudden major expansion of the navigation season but stressed the advantages of limited extensions which appeared more feasible, considering

¹These dates are considered by the Corps of Engineers to approximate normal closing and opening dates for the locks and canals which connect the lakes and join them to the Seaway.

27ST DOCUMENT AVAILABLE



PROFILE OF GREAT LAKES-ST. LAWRENCE NAVIGATION SYSTEM



Upper Four Lakes

Below Lake Erie

SOURCE: Corps of Engineers

the problems to be solved and the funds that would be required. This report also indicated that existing high insurance rates could be an obstacle to shippers' participating in an extended season. The Corps recommended a thorough study to pinpoint the cost, economic justification, and degree of Federal agency activities needed in a project or program which would permit navigation for all or part of the winter season.

Section 107 of the River and Harbor Act of 1970 (Public Law 91-611, Dec. 31, 1970) authorized the Corps to conduct a program to demonstrate the practicability of winter navigation on the Great Lakes-St. Lawrence Seaway system.

The program was to include three elements.

1. A detailed survey or feasibility study to determine the economic justification, engineering practicability, and environmental and social impacts of an extended season and to determine the extent of Federal participation in any recommended plan of improvement.
2. A demonstration program designed to demonstrate the practicability of extending the season.
3. An insurance study to be conducted by the Secretary of Commerce to identify the ways and means to provide reasonable insurance rates for those engaged in extended-season operations.

The act authorized \$6.5 million for the 3-year demonstration program and directed the Secretary of the Army to report to the Congress on the demonstration program results by July 30, 1974.

The act was amended by the Water Resources Development Act of 1974 (Public Law 93-251, Mar. 7, 1974) which extended the demonstration program for two additional winter seasons and increased funding for the demonstration program to \$9.5 million. The Secretary of the Army's report on program results is due December 31, 1976.

The Corps has begun work on the survey study and plans to submit it to the Congress in mid-1977. The Corps estimates that the survey study will cost about \$3 million in addition to the \$9.5 million authorized for the demonstration program element.

2 An insurance study, completed in 1972 by the Maritime Administration, Department of Commerce, stated that, under present marine insurance company policy, major increases in insurance rates would occur for vessels traversing the lakes in the winter season. It stated also that rates could double for the last 2 weeks of December and triple for the first week in January. In addition, the insurance companies might lower rates considerably when the extended navigation season proved that winter transportation was relatively safe. If not, Federal subsidies of insurance rates would probably be necessary initially to induce shippers to ship in the winter season.

3 The demonstration program is being conducted by the Corps in cooperation with the Department of Transportation (Coast Guard and Saint Lawrence Seaway Development Corporation), the Department of the Interior, the Department of Commerce (Maritime Administration), the Environmental Protection Agency (EPA), other Federal agencies, and non-Federal public and private interests. The program includes:

- Ship voyages extending beyond the normal navigation season.
- Observation and surveillance of ice conditions and ice forces.
- Environmental and ecological investigations.
- Collecting technical data on improved vessel design, ice control facilities, and aids to navigation.
- Collecting and sending information to shippers on weather and ice conditions.

8 The demonstration program is directed by a Winter Navigation Board (WNB) chaired by the Corps' Division Engineer, North Central Division, Chicago, Illinois. The next level of organization is the working committee under the direction of the Corps' District Engineer, Detroit, Michigan, which is responsible for formulating, coordinating, and reporting program activities. Seven work groups, each under the leadership of a designated Federal agency (referred to as a lead agency), have been established to carry out the approved program activities. Advisory groups, technical advisors, and observers at the various levels of organization also help in carrying out these activities. (See app. I for an organizational chart.)

The scope of our review and the U.S. agencies contacted are shown in chapter 5. We also discussed the matters which concern Canadian interests with officials of the Canadian Government.

On the basis of the results of the demonstration program and the survey study, the Corps will decide whether to request the Congress to authorize a permanent winter navigation season. The Corps' preliminary benefit-cost ratio for a permanent program is 7.1 to 1, with a total investment cost of \$192 million. (See ch. 4.)

- - - -

Our previous report, "Status of the Demonstration Program for Extension of the Navigation Season on the Great Lakes and St. Lawrence Seaway" (B-175460, Feb. 22, 1973), dealt with the status of the demonstration program after its first year of operation.

This report provides the Congress with an overview of the program's accomplishments and continuing problems.

CHAPTER 2

PROGRAM ACCOMPLISHMENTS AND FUNDING

Traffic during the winter navigation season, an important measurement of program success, claimed by the Corps has been limited to certain geographical areas, commodities, and shippers, and much of the claimed traffic was not a direct result of demonstration program activities.

Most of the funds used for winter navigation activities have come from regular appropriations of participating agencies rather than from appropriations specifically made for the demonstration program. The Congress has not been furnished with consolidated funding information which, we believe, is necessary to accurately evaluate program results as well as future funding levels.

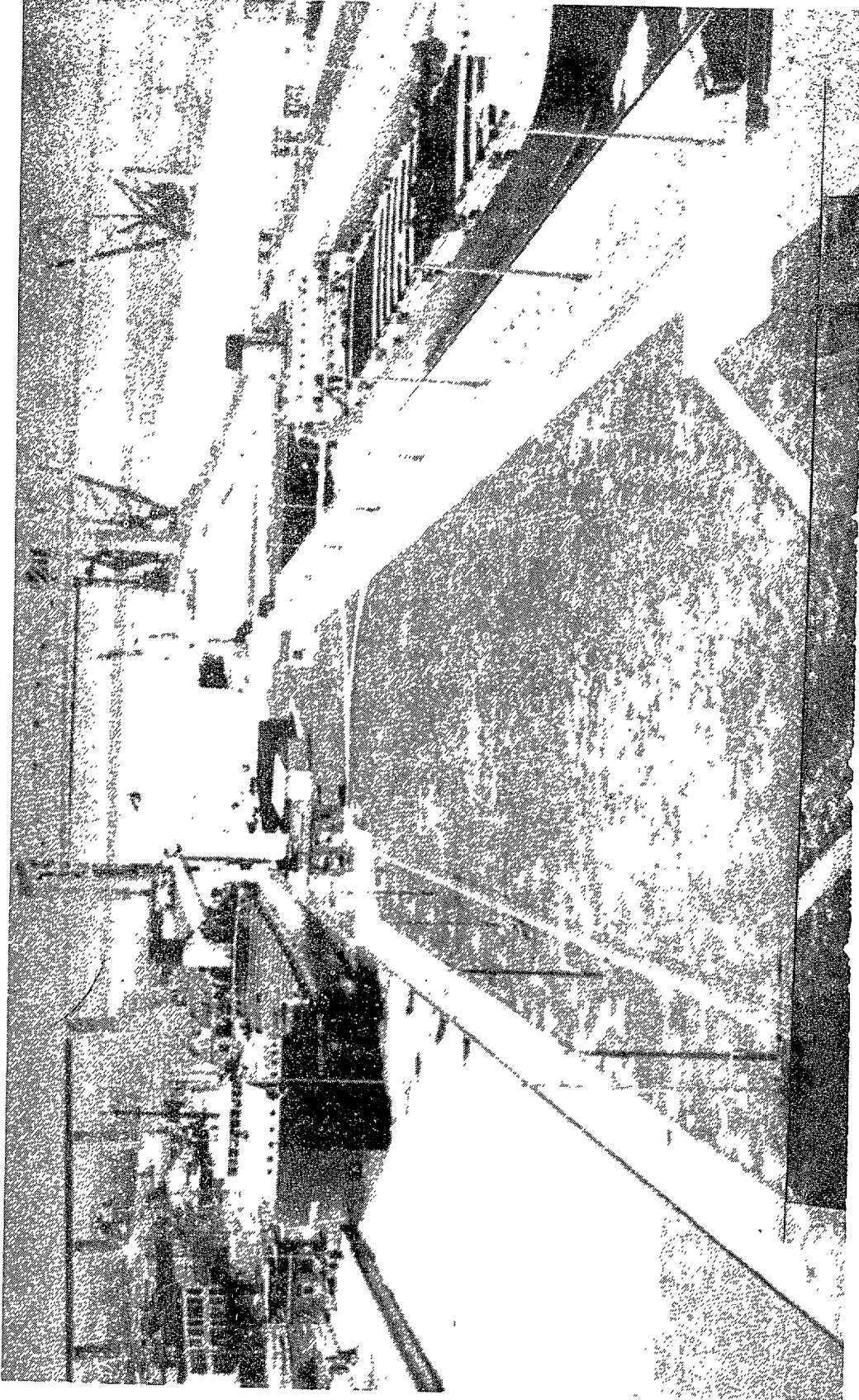
PROGRAM IMPACT

Most of the increased traffic claimed by the Corps during the extended navigation season has been limited to the upper four lakes, Superior, Michigan, Huron, and Erie. The largest volume of traffic during the extended season has moved from Lake Superior to southern Lake Michigan and Lake Erie. Traffic through the St. Lawrence Seaway traditionally has been curtailed in December and, because of certain problems, program activities have not changed the Seaway's closing dates more than a few days. (See ch. 3.)

The Corps uses the period December 16 to March 31 to measure accomplishments of the demonstration program. The locks at Sault Ste. Marie, Michigan (commonly known as the Soo locks), are located at the mouth of Lake Superior, and all ships exiting Lake Superior must pass through these locks. (See photograph on p. 8.)

The closing date of the Soo locks has been recognized as the end of the interlake shipping season. During the demonstration program, the Corps' policy has been to keep the locks open as long as there is a traffic demand and weather conditions permit operations.

As shown below, Soo locks closing dates have extended well beyond the December 16 date for several years preceding the winter of 1971 which was the start of the extended-season program.



**SOURCE: CORPS OF ENGINEERS
MAC ARTHUR AND POE LOCKS AT SAULT STE. MARIE, MICHIGAN**

<u>Season</u>	<u>Soo locks closing date</u>
1967	Dec. 31, 1967
1968	Jan. 4, 1969
1969	Jan. 11, 1970
1970	Jan. 29, 1971
1971	Feb. 1, 1972
1972	Feb. 8, 1973
1973	Feb. 7, 1974
1974	Open all season

Because of demonstration program activities which were geared to helping ships transit the lakes in ice, more U.S. commercial shippers have operated through the Soo locks beyond December 15. But only one, a steel company, shipped beyond January 31. Furthermore, this company, which accounts for the largest volume of traffic shipped during the extended season, had started extended-season operations in the winter 1967-68, 4 years before the demonstration program began.

An official of this company said the major factors influencing its late season operations were extensive ice-breaking assistance by the Coast Guard, extending lock operations by the Corps, and the strengthening of some of its vessels for winter operation. Also, insurance rates, which were an inhibiting factor to late season navigation, would not apply to this company since it was self-insured. According to the Coast Guard, other shippers are handicapped in attempting to operate beyond January 31, since most of their fleets consist of old vessels that have not been strengthened for winter operation. Also, these older vessels do not have enough power to cope with the ice cover experienced after January 31.

According to the Corps, 3.7 million tons of cargo were moved systemwide in the 1971-72 winter season, 7.3 million tons in 1972-73, 10.9 million tons in 1973-74, and 15 million tons in 1974-75.

We noted, however, that much of the traffic claimed by the Corps occurred either very early in the winter season or year round in more temperate latitudes. The Corps reported that about 60 percent of the tonnage shipped in the first three winter seasons was shipped between December 15 and 31. Ice conditions in the upper four lakes are usually minimal during that period, and, as was previously stated, the Soo locks had accommodated traffic during that period for the 4 years preceding the program.

Moreover, most cargo movements between January 31 and April 1 involved intralake traffic, primarily in Lake Erie. These intralake shipments on the St. Clair-Detroit River system and coal shipments to Detroit from Sandusky, Ashtabula, and Toledo, Ohio, had historically occurred year round because of the more temperate latitudes (and correspondingly less ice cover) and Coast Guard icebreaking assistance. This traffic, to a large extent, would have occurred without a demonstration program.

Demonstration program tests and activities undoubtedly have contributed to a better understanding of the problems associated with extended-season operations and have had some impact on extended-season traffic. We believe, however, that other factors essential to, but not included as part of the demonstration program, have had a greater impact on traffic. The most important of these factors include major changes in icebreaking policies by the Coast Guard and extended lock closing dates made possible by a lack of severe weather.

Icebreaking policy change

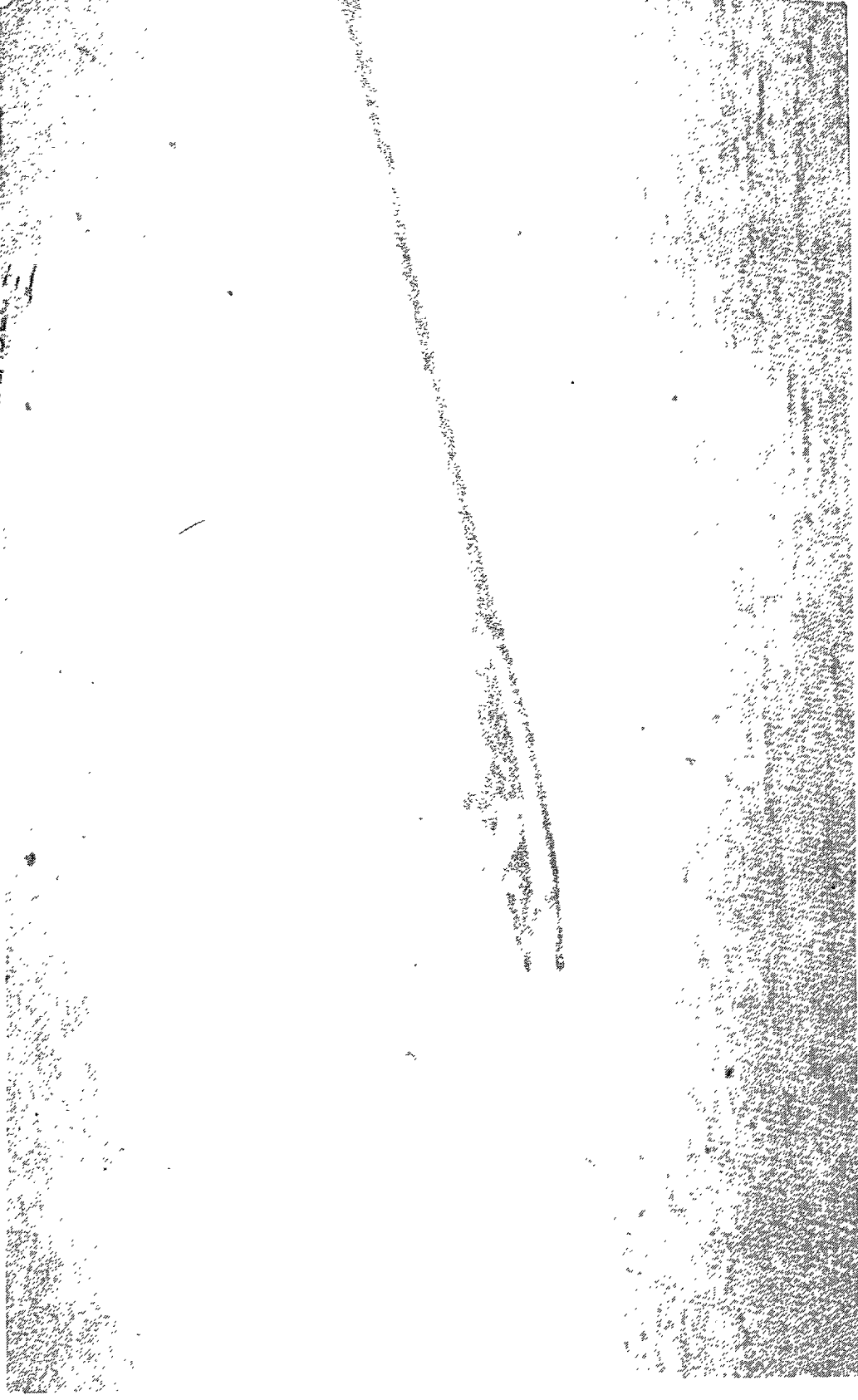
One of the most important factors accounting for extended winter operations has been the change in the Coast Guard's icebreaking policy since fiscal year 1969. Previously, the Coast Guard's winter activities were to prevent ice jams, maintain a traffic control system, and make search and rescue missions. The current icebreaking policy includes keeping main waterways open through preventive icebreaking and convoy operations, clearing harbors and docks, and analyzing vessel itinerary information to determine where vessels most probably could become icebound. Since fiscal year 1972, the Coast Guard also has conducted night icebreaking operations. According to the Coast Guard, icebreaking resources are taxed to the limits under its current policy. (See photograph on p. 11.)

Coast Guard officials have stated that regardless of the results of the program, it is unlikely that the Coast Guard will be able to retrench from its current level of service. The Department of Transportation has stated that, everything else remaining equal, it is likely that the requirement for Coast Guard ice operations will not greatly diminish regardless of the outcome of the demonstration program.

Extended lock operations made possible by lack of severe weather

Perhaps the most important factor influencing extended-season lock operation is ice conditions affecting operations

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SOURCE: CORPUS OF ENGINEERS
COAST GUARD ICE BREAKER IN UPPER LAKE MICHIGAN

in the St. Marys River and interfering with the Soo locks operations.

In the fourth year of the demonstration program (the winter of 1974-75), Federal, State, and local officials developed an operational plan to curtail shipping and to close the Soo locks if conditions became too severe in the St. Marys River. However, because the winter was not severe and the role of the Coast Guard's icebreakers was expanded, shipping continued year round.

Meteorological data covering a recent 20-year period showed that Lake Superior--which flows into the St. Marys River--experienced severe winters during 7 years, normal winters during 11 years, and mild winters during only 2 years.

The weather and resulting ice cover throughout 1974-75 were not severe and contributed greatly to extended season operation. Because of the weather conditions, ship movements throughout a severe winter have not been demonstrated.

Conclusion

Traffic claimed by the Corps as a result of the demonstration program included a considerable amount of traffic which was not primarily due to the program. About 60 percent of the shipping occurred late in December, a period during which the Soo locks had been open for 4 years preceding the program. Also included were year-round, intralake shipments which had been occurring before program inception. Since the Corps and other involved agencies have emphasized the amount of traffic as a major test of feasibility, the amount claimed should be only that traffic which is directly attributable to the program.

Recommendation

We recommend that the Secretary of the Army direct the Corps of Engineers to reevaluate its procedures for determining traffic claimed for the demonstration program. The traffic claimed should be only that which is a direct result of the demonstration program. The Corps should use a starting date for calculating program accomplishments which better reflects preprogram Soo locks closing dates and a method for eliminating those shipments which would occur without a program.

Agency comments

The Department of the Army and WNB told us (see apps. II and III) that, according to the third annual report on the

demonstration program, about three-fourths of the total February and March traffic normally occurred and was not creditable to the demonstration program. Although the narrative section of the report did contain the subject statement, which referred to intralake shipments only, no mention was made of the fact that interlake traffic was moving through the Soo locks during the winter season before the demonstration program started. Also, none of the traffic tables in the annual report indicated that much of the traffic was not a result of the demonstration program.

The Department of the Army and WNB said that studies underway would be carefully developed to insure supportable estimates of potential future traffic. WNB also said that future traffic calculations would not include traffic which was not sensitive to the program.

PROGRAM FUNDING

In seeking appropriations for the demonstration program, the Corps presents to the Congress information showing the total funds directly earmarked for program activities--demonstration program and survey study funds. Other funds used for activities by the Corps and other agencies which contribute directly or indirectly to winter navigation are included in each agency's budget submissions. These funds amount to almost three times the amount budgeted specifically for the demonstration program.

According to the Corps' records, the total budgeted funds for extended-season operations through fiscal year 1975 were:

<u>Type of authorization</u>	<u>Budget funding allocations FY 1972-74</u>	<u>Budget funding allocations FY 1975</u>	<u>Total budget funding</u>
Ongoing programs (all participating agencies)	\$12,687,000	\$5,164,000	\$17,851,000
Demonstration program	4,673,000	1,827,000	6,500,000
Survey study	<u>382,000</u>	<u>500,000</u>	<u>882,000</u>
Total	<u>\$17,742,000</u>	<u>\$7,491,000</u>	<u>\$25,233,000</u>

Among the activities related to extended winter navigation but funded from ongoing appropriations are the Corps' Soo locks operations, the Coast Guard's icebreaking activities, and some Maritime Administration research and development.

In connection with funding for the demonstration program, (1) WNB members have expressed concern over the inability to satisfy direct and indirect demonstration program needs from

funds appropriated specifically for the program, (2) industry representatives have expressed concern that current levels of support will be withdrawn to their detriment, and (3) the Office of Management and Budget had taken a position opposing any further increase in regular Coast Guard funding for related demonstration program activities until the demonstration program is completed and its results are analyzed.

Conclusion

We believe the Corps' appropriation requests and reports to the Congress on the program should include information on all participating agencies' use of their regular appropriations for extended-season activities.

Such information will allow the Congress to

- be more fully informed of winter navigation activities,
- evaluate the total funding levels requested and required for winter navigation, and
- better determine whether agencies' activities and regular appropriations are used to establish a de facto permanent extended season without congressional authorization.

Recommendation

We recommend that the Secretary of the Army require the Corps to include information in its funding requests and reports to the Congress on all participating agencies' use of their regular appropriations for the demonstration program.

Agency comments

Both the Department of the Army and WNB agreed with our conclusion and recommendation. (See apps. II and III.) WNB said its final demonstration program report to the Congress would include a coordinated funding statement for the entire demonstration program.

CHAPTER 3

MAJOR PROBLEMS NEED TO BE RESOLVED

There are major problems which must be resolved before conclusive judgments can be made on the practicability of permanently extending the winter navigation season. Two problems relating to the feasibility of extending season operations in the lower Great Lakes and the St. Lawrence Seaway follow.

- Use of the waterways during the winter season by both power and navigation interests. Electric power interests, with the assistance of ice booms, create a stable ice cover necessary for the uninterrupted generation of electricity; however, safe passage of vessels through these ice booms requires icebreaking. These uses can also affect the integrity of the river by altering flows.
- Lack of planning compatibility between the United States and Canada. Winter navigation below Lake Erie depends on Canadian cooperation, because the Welland Canal and portions of the St. Lawrence Seaway and River are Canadian territory. Also all the Great Lakes, except Lake Michigan, are boundary waters. To date, no coordinated plan of action has been developed with the Canadians, and there is no commitment that Canada will participate in any extended-season activities.

There are also unresolved questions about the potential environmental damage in the Great Lakes and the St. Lawrence Seaway. Potential areas of environmental concern include the effect of winter navigation on shorelines and shore installations, water quality, water levels and flows, and aquatic ecology. There is also a related problem involving the disruption of transportation to and from inhabited islands in the St. Marys River.

WATERWAY USES BY POWER AND NAVIGATION INTERESTS

Electric power interests need stable ice cover to aid in the generation of electricity, whereas the passage of vessels requires icebreaking.

Stable ice cover has an insulating effect which retards the formation of excessive ice and thus helps maintain water flows beneath the ice cover. This stable water flow is necessary for consistent power output by the various hydroelectric

powerplants in the Great Lakes area. On the other hand, broken ice (particularly ice jams) created by navigation, can alter the water flow and levels at an entrance or discharge from a power dam and thus affect power generation. These ice jams also adversely affect the integrity of a river by altering flows and levels.

The Great Lakes-St. Lawrence Seaway system is an important source of electric power in both the United States and Canada. Each country has hydroelectric powerplants located in all channels connecting the system--except for the St. Clair and Detroit Rivers and the Straits of Mackinac. The installed capacity of U.S. powerplants amounts to about 2.5 percent of the entire U.S. generating capacity.

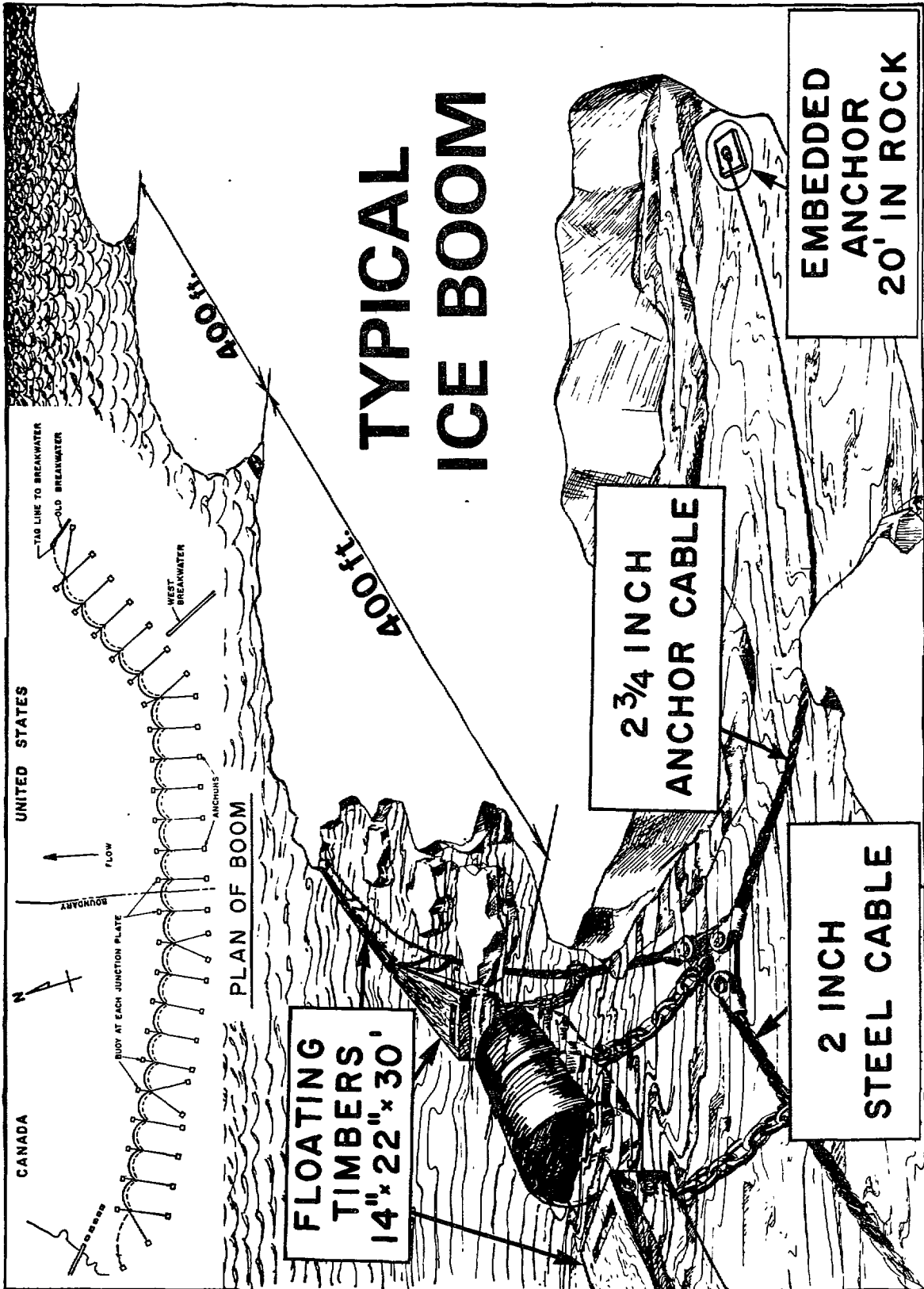
Some geographical areas heavily depend on power generated by these hydroelectric plants. Combined United States and Canadian complexes on the Niagara and St. Lawrence Rivers have a capacity of about 12 and 31 percent, respectively, of the total power capacity in the markets served by these plants.

The power companies insure a stable ice cover with the assistance of manmade devices, known as ice booms.¹ Such devices, which are used extensively in certain areas, are a barrier to extending the navigation season, since, as presently designed and constructed, they do not permit the passage of ships. (See illustrations on pp. 17 and 18.)

Any steps taken to navigate through ice in connecting channels of the system where powerplants are located requires that certain technical and legal problems be resolved. The technical problems primarily involve how to navigate through the ice booms without adversely affecting power production. The legal issues revolve around the international scope of much of the Great Lakes-St. Lawrence Seaway system.

The Boundary Waters Treaty of 1909 established the International Joint Commission (IJC) to prevent and help settle disputes between the United States and Canada regarding the use of boundary waters. Except for Lake Michigan, all of the Great Lakes and their connecting channels are defined as boundary waters in the treaty. This treaty established the following order of precedence for using these waters: (1) domestic and sanitary purposes, (2) navigation, and (3) power and irrigation purposes.

¹Ice booms are large floating timbers connected with heavy cables and anchored to the river bottom.



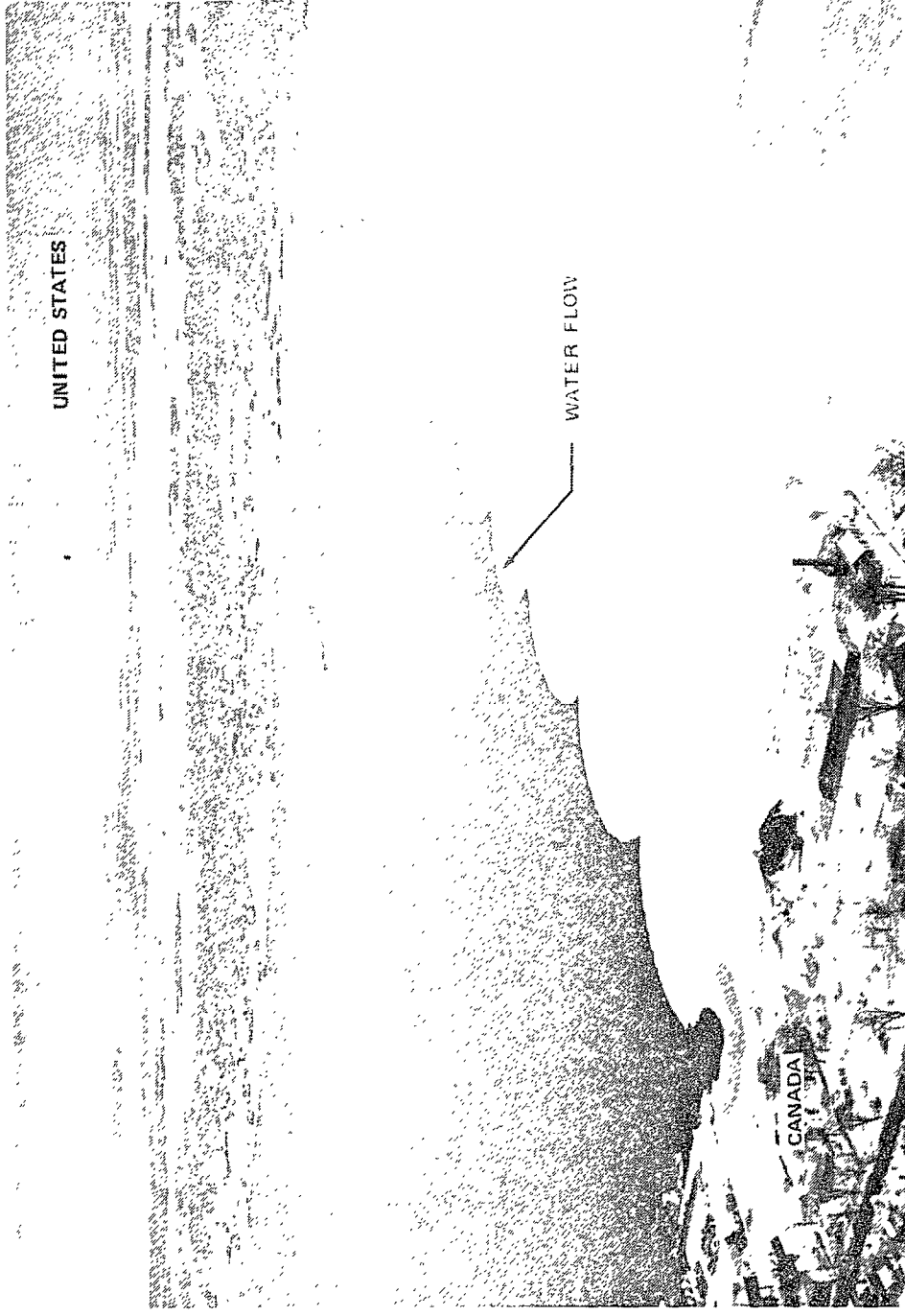
TYPICAL ICE BOOM

**FLOATING
TIMBERS,
14" x 22" x 30'**

**2 3/4 INCH
ANCHOR CABLE**

**2 INCH
STEEL CABLE**

**EMBEDDED
ANCHOR
20' IN ROCK**



SOURCE: POWER AUTHORITY OF THE STATE OF NEW YORK

CROSSING the St. Lawrence River from Prescott, Ontario, to Ogdensburg, New York, is an ice boom installed by the Power Authority of the State of New York and the Hydro-Electric Power Commission of Ontario. Ice booms prevent jams and flooding by forming an ice cover beneath which water can flow freely.

IJC, a permanent body made up of three members each from the United States and Canada, is responsible for acting on proposals which will affect the natural level and flow of the boundary waters and investigating and making recommendations on specific problems referred by either or both Governments.

The St. Lawrence Seaway and Power Project was cooperatively undertaken by the United States and Canadian Governments to develop deep-draft navigation and hydroelectric power. Controlled flows of the St. Lawrence River, which drains the entire Great Lake basin, provide a major advantage for the production of hydroelectric power.

The Power Authority of the State of New York and the Hydro-Electric Power Commission of Ontario, a Canadian power entity, shared in the development and cost for all items common to navigation and power in the international section of the Seaway which extends from Lake Ontario to St. Regis, New York. Federal legislation in each country established the St. Lawrence Seaway Development Corporation in the United States and the St. Lawrence Seaway Authority in Canada to construct, operate, and maintain those features of the project which are for navigation.

A River Control Board of IJC said the St. Lawrence Seaway and Power Project was not designed and constructed to provide for joint use of the river by power and navigation during the winter. Moreover, although the 1909 treaty gave navigation precedence over power, IJC assigned to the power entities the responsibility for regulating water levels and flows. Inherent in this responsibility is the obligation to maintain the discharging capability of the river throughout the winter to help regulate water levels and flows. Both winter navigation and power operations can affect the basic integrity of the river because both activities can alter water levels, which could result in flooding and increased erosion. According to the power companies, using ice booms to form a stable ice cover is essential in regulating river flows.

Coordinating winter waterway uses

One of the major areas of investigation by the Seaway Corporation under the demonstration program has involved methods of navigating through ice booms without disrupting power operations. The planning and implementing of activities aimed at solutions have been controversial and have not always followed accepted testing methods. Apparently, extensive research and development needed to find a solution would exceed the present time frames for the demonstration program.

During the second year of the demonstration program, the Seaway Corporation, after receiving permission from the power companies, designed and installed a movable gate in the largest ice boom in use in the St. Lawrence River. This ice boom, known as the Ogdensburg-Prescott boom, extends 5,100 feet across the river. Modifying this boom to permit vessel passage is one of the major program objectives for extending the navigation season in this area.

The agreement, however, prohibited experimentation or operation with the modified gate until the Seaway Corporation would apply to IJC to relieve the power entities of responsibility for damages, such as power loss or flooding, resulting from any experimentation. WNB supported this course of action. However, the Department of Transportation said that the Corporation did not apply because it could not yet provide IJC with enough engineering data. The Corps said that, without this data, IJC would be unable to rule on the issue.

Under these circumstances, the power interests would not accede to operational testing of the Ogdensburg-Prescott boom gate; thus the gate has not yet been tested in ice conditions. The Seaway Corporation then formulated plans to install and test an ice boom at Ogden Island--another important ice boom site in the St. Lawrence River. Power interests opposed this plan, and it was rejected at a meeting between power and navigation interests in July 1974 because of the increased risk of ice jamming which could cause power losses if the boom failed.

At a WNB meeting in August 1974, the Copeland Cut area in the Wiley-Dondero Canal was selected as the site for prototype ice boom field tests. A boom was installed and tested at Copeland Cut even though various board members were concerned that conditions at the test site were too unlike the main ice boom sites to be able to extrapolate test results. The problem of similar conditions or the adequacy of the test site at Copeland Cut, we believe, was not adequately explored because of the short time left between the original decision to use Copeland Cut in August 1974 and the time frame needed for installation of the test boom for the 1974-75 winter season.

One essential criterion for the site selection was safety, both with respect to maintaining river outflows and in the event of a boom failure, minimizing damage to other interests near the site. A contractor, hired by the Seaway Corporation to analyze the data gathered during the test, concluded that the Copeland Cut ice boom test was successful and helped answer some of the questions regarding the behavior of an unconsolidated ice cover on a river.

The U.S. State Department, the official agency for coordination with Canada, did not have a representative on WNB until the third program year. Canadian observers to WNB, however, have participated since inception of the program.

A 4-year study of the technical and economic feasibility of a Canadian extension of the navigation season was proposed by the Canadian Government in 1973. In November 1975 Canadian officials said that the proposal had never been funded; however, some projects and technical studies related to this study had been done using funds of individual agencies.

This study would have examined the feasibility of lengthening the season to January 31; however, the Director of the St. Lawrence Seaway Authority stated that the Canadian Government, on the basis of partial study results, was considering extending the navigation season to the end of December and then attempting to open the season 2 weeks earlier in the spring. As late as November 1975, Canadian officials were not considering any plan to extend the navigation season past December 31 or open earlier than March 15. The U.S. demonstration program is emphasizing activities which will assist in extending the season into January and February.

Also, apparently the two countries are stressing somewhat different prime elements in an economic feasibility study of a permanently extended navigation season program. The Canadian study plan required, as a prerequisite to extending the navigation season, a detailed analysis of sources of revenues that would be required to recover investment and operating costs. Under the U.S. demonstration program, cost-sharing concepts between the Governments or between the U.S. Government and the private sector have received little attention. Although activities in the U.S. demonstration program which could have an impact on Canadian interests have been discussed with the Canadian observer to WNB, Canadian agency officials have said that increased communication and Canadian participation is needed because of demonstration program activities planned in the international section of the Seaway.

POTENTIAL ENVIRONMENTAL DAMAGE

Federal agencies are required by the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.) to prepare an impact statement before each major action, recommendation, or report on legislation that may greatly affect the quality of the environment.

The impact statement documents the environmental consequences of a proposed action, builds into the Federal agency decisionmaking process an awareness of environmental considerations,

and promotes efforts to prevent or eliminate damage to the environment. Also, the River and Harbor Act of 1970, which authorized the program, specifically requires that the Corps, in the survey study, determine environmental impacts of an extended season. Corps regulations state that such determinations should include

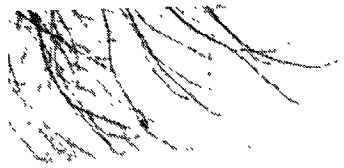
- identification of anticipated project-caused economic, social, and environmental effects;
- quantitative and qualitative description and display of the effects;
- evaluation of the effects, whether adverse or beneficial; and
- consideration of measures to be taken if a proposed project will cause adverse effects.

In accordance with the National Environmental Policy Act of 1969, an environmental impact statement has been issued annually by the Corps for each year's demonstration program, and a final impact statement is to be issued with the survey study in 1977. The Corps' impact statements have identified a number of problems. However, various governmental bodies are concerned about the amount of consideration given in these statements to the actual or potential environmental impacts of an extended navigation season. Some of the concerns involve (1) delays and shortcomings in collecting data, (2) the lack of a systematic plan for preparing the final environmental impact statement, and (3) a need to address legal and financial responsibilities for any adverse impacts resulting from the program.

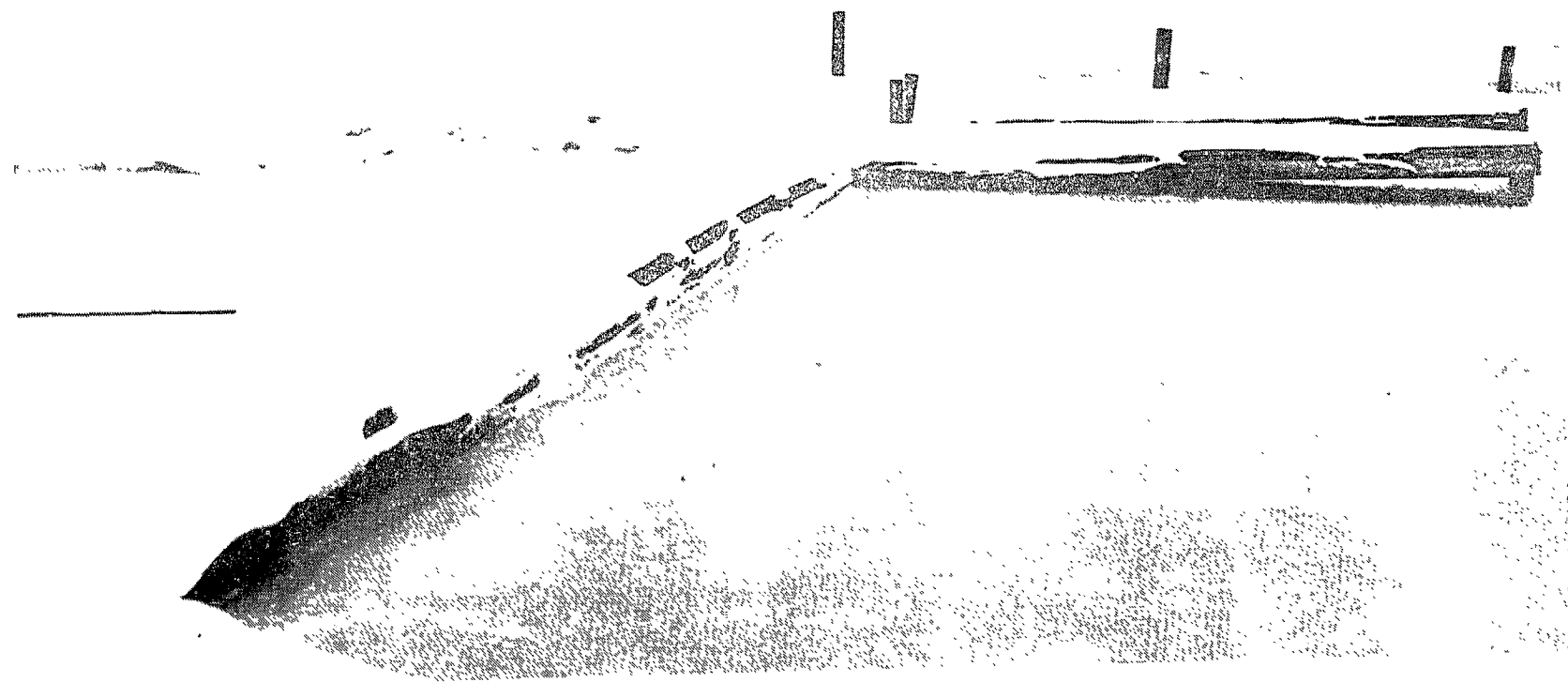
Environmental impacts

The Corps has recognized a number of potential environmental impacts resulting from an extended navigation season. These include shoreline erosion, shore structure damage, increased pollution of waterways, and flooding. In addition, proposed measures for ice control, such as air bubbler systems and the use of waste heat discharges in navigation channels, could adversely affect the aquatic ecology.

Winter navigation poses a hazard to shorelines and shore structures because of shifting ice and ice pressures created under the ice from vessel movements. (See photograph on p. 25.) Shoreline erosion and structural damages have been documented in a report on the St. Marys River where previous vessel passages through ice-covered channels have been concentrated. The report concluded, however, that there was a need for a



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**SOURCE: CORPS OF ENGINEERS
PRIVATELY OWNED DOCK ON ST. MARYS RIVER**

more comprehensive study to (1) define the specific nature and extent of shore and structure damage, (2) estimate its present and prospective costs, (3) provide for appropriate remedial measures, and (4) determine the cost of remedial measures to the United States. Also, the Corps anticipates that a permanently extended navigation season program would cause extensive shoreline property damage in the St. Clair River area because of its high density of shoreline structures. WNB said that measures to mitigate damages would be recommended in the feasibility report.

The U.S. Coast Guard has reported that the extended winter navigation season will somewhat increase the risk of pollution from oil spills because, for the most part, vessels used in the Great Lakes are not designed to operate in icy conditions. According to the Coast Guard, winter operations increase the possibility of vessel collisions, groundings, or accidental spillage in transfer operations. Oil-powered fleet vessels, the likely source of such pollution, generally carry between 40,000 and 100,000 gallons of fuel.

The discharge of wastes during vessel operations, such as garbage, bilgewater, and water used to wash decks, could also be a problem. WNB's Environmental Evaluation Work Group is concerned that extending ship operations will shorten the period the waters have for natural cleaning processes. Further, certain pollutants will not degrade with the colder water temperature. The buildup of this waste could cause increased pollution problems in the spring with the sudden degrading of increased wastes resulting from warming temperatures.

The Corps has stated that increasing frequency of ice jams on rivers and channels, especially the St. Clair River, are an unavoidable impact of the extended season due to ice-breaking activities. Ice jams can cause rising water levels and thus increase the possibility of flooding.

Concern also has been expressed that proposed improvements for extended-season operations may have adverse impacts on the environment. Two methods being considered by WNB to inhibit ice buildup in channels and harbors are bubbler systems (see p. 27) and using heated waste discharges from possible future nuclear powerplants. Many environmental groups are concerned about the possible environmental impact of both of these systems.

The concern involving bubblers--which have been tested in operation during the program--centers around their potential (particularly the large-scale systems) to disrupt fish migration and behavior patterns. Further, separate environmental evaluation may be required for each bubbler system, because the

WNB said ice boom testing at Copeland Cut was the first part of a larger plan for navigating through winter ice booms. WNB indicated that successful navigation through ice booms on the St. Lawrence River will require extensive research and development. Also, a panel of technical consultants to WNB has expressed reservations about the current test program because the preferred sequence of testing in a project of this type was not followed. Model studies, for example, which usually precede prototype or field testing were not made.

With respect to legal problems, WNB established a legal advisory committee which held its first meeting in February 1975. This committee is concerned primarily with the power-navigation conflict in the international section of the St. Lawrence Seaway. The Corps of Engineers has stated that it will be necessary to obtain the approval of IJC on any implementing plan for an extended winter navigation season. It is not certain, however, as to whether this can be done before the planned submission of the survey report to the Congress.

In November 1975 this committee completed a first draft of its report concerning the legal problems inherent in an extended navigation season program.

Position of power and navigation interests

United States and Canadian power interests do not oppose extending the navigation season in principle. They take the position that icebreaking may result in damage to their properties or disruption of operations and, therefore, before experimentation is undertaken, those involved with such activities must recognize and accept full legal and financial responsibilities for any adverse consequences.

The problem, as viewed by navigation interests, is one of determining what actions will be needed to allow winter navigation while still maintaining (1) the stability of the ice cover and (2) the stable river flow of the St. Lawrence River. Also, the Seaway Corporation noted that the need for maintaining these conditions is unquestioned because the potential negative effects on navigation--such as damage to vessels--are as great as those on power and other interests.

The Seaway Corporation has recognized the need for ice boom modification because the current ice booms were not intended for use with navigation. Further, it advised us that recent advances in ice engineering and technology would permit the design and construction of additional ice control facilities on the river which would allow winter navigation.

Problems arising from the winter uses of the waterway by power and navigation were perceived before the demonstration program. At that time, it generally was accepted that ultimately IJC would have to decide the legal and financial responsibilities for navigation through ice booms. However, the Department of Transportation (see app. IV) said that the problem would not have to be presented to IJC. The Department said that the exchange of diplomatic notes between the two countries when the original navigation improvements were made on the St. Lawrence River would appear sufficiently comprehensive to include the season extension program.

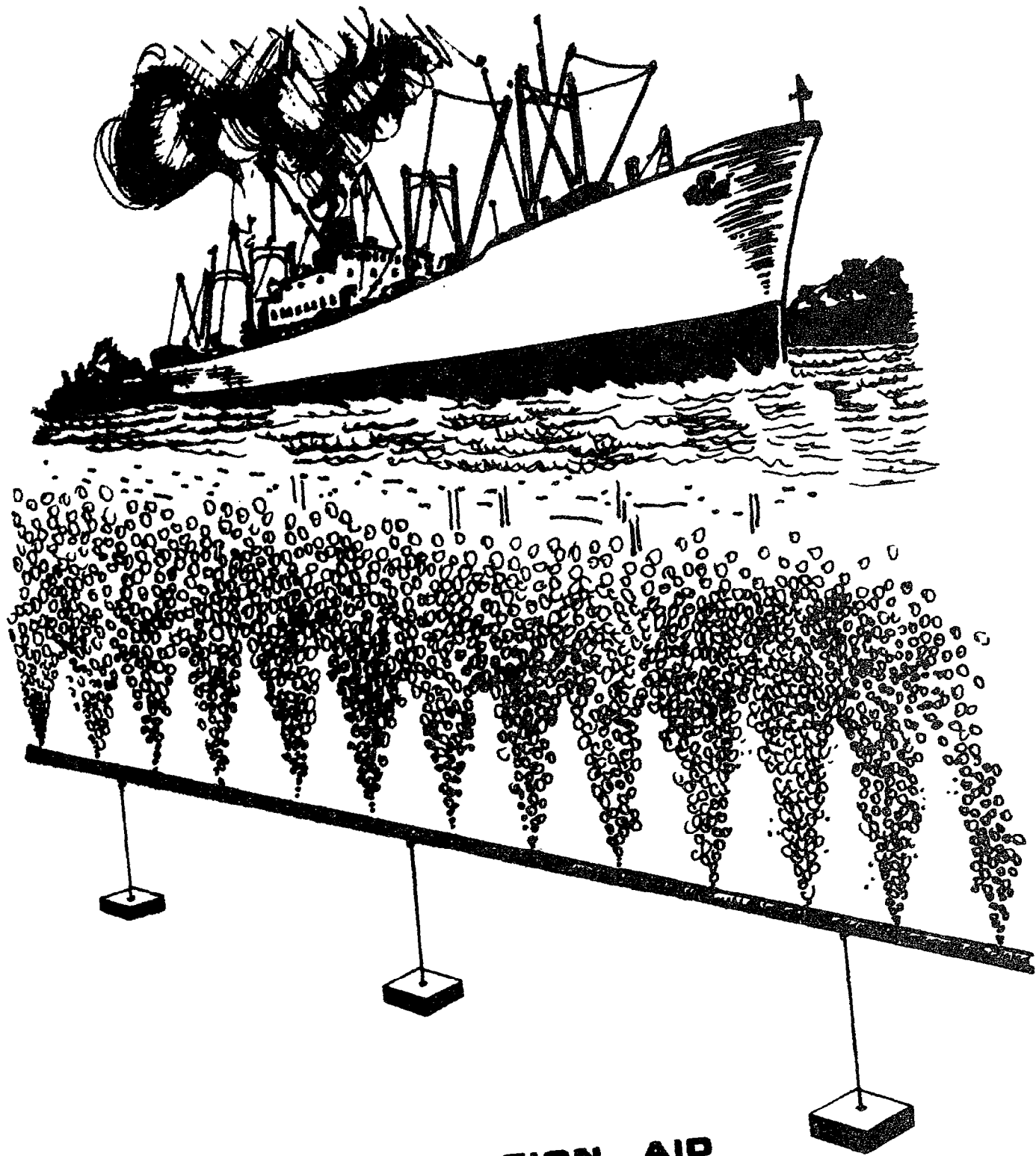
LACK OF COORDINATED PLANNING WITH CANADA

Winter navigation below Lake Erie completely depends on Canadian cooperation, because the Welland Canal and about half of the St. Lawrence Seaway lie in Canadian territory. These are also the controlling reaches for navigation in the Great Lakes-St. Lawrence Seaway system. Also, all Great Lakes, except for Lake Michigan, are boundary waters between the two countries and extended-season activities can have an impact on Canadian interests.

The extensive port facilities at Montreal, Canada, located about 1,000 miles from the Atlantic Coast, are now open to shipping year round. Montreal also is situated near the entrance to the section of the Seaway which lies completely in Canada--extending about 70 miles from Montreal to the international boundary at St. Regis, New York. The most severe ice problems usually are experienced in this section--with ice formations occurring about 1 to 3 weeks earlier than in the international section of the Seaway.

Numerous facets of extended-season navigation on the Great Lakes and St. Lawrence River, including environmental issues and legal responsibility for damages, affect both the United States and Canada. For this reason many of the technical and legal problems will be common to both countries. Any decisions pertaining to extending the navigation season in these international areas will depend on coordinated planning between the two countries, including reaching common goals and initiating coordinated activities.

A Corps official stated that in November 1975 there was a meeting between WNB officials and representatives of the Canadian Government concerning a plan of action; however, no agreement between the two parties on the extent to which Canada was willing to participate in the demonstration program or in a future permanent program had been developed.



WINTER NAVIGATION AID

Artist's view of U.S. Corps of Engineers' "bubbler" which uses an air compressor to pump dry air into a length of pipe with spaced holes, causing bubbles to rise and circulate warmer bottom water to the surface, thus preventing ice from forming in shipping lanes.

relative importance of environmental impacts would depend on location, surroundings, and operational characteristics affecting a diverse array of biological, chemical, and physical factors.

The Fish and Wildlife Service, Department of the Interior, questioned the environmental feasibility of using heated effluent water from nuclear power-generating plants to maintain relatively ice-free channels. This technique has not been tested during the demonstration program; however, such a test is planned for the final program year. The fiscal year 1974 environmental evaluation report by the WNB's Environmental Evaluation Work Group indicated that using heated discharge water can have major effects on fish and other organisms.

In connection with environmental impacts, Canadian officials were concerned about possible environmental impacts on Canadian territory of this year's U.S. demonstration activities in the St. Marys River. Also, they were concerned that the United States had considered the effects of program activities on the United States and on international sections of the waterway but had not considered effects on areas wholly within Canada, such as the lower part of the Seaway.

Environmental evaluations

As can be seen, there are numerous potential environmental impacts of an extended season. After 4 years of the demonstration program, these potential impacts have yet to be comprehensively studied. Environmental evaluations of proposed improvements generally have been limited to specific activities and locations under the demonstration program. The Environmental Evaluation Work Group is concerned about the inadequate biological and other environmental data collections and WNB's lack of effort to demonstrate seasonal effects of the operation of ice control measures. Some of the specific concerns this Group cited included:

- The need for individual environmental evaluations of all future ice suppression systems and ice control structures because the potential problems depend on the location of the installation.
- The inadequacy of past operational experience of air bubblers for extrapolation of data to large bubbler systems or to other locations.
- The need for extensive test and evaluation of thermal ice suppression, rather than the very limited testing presently being done, before accepting this method as environmentally sound for ice suppression needs.

The Group concluded that environmental evidence collected to date was insufficient to cover all areas of potential application of specific season extension measures and could not be used to base extension and extrapolation of limited demonstration projects into systems covering entire channel reaches and lake areas.

There is also disagreement as to the adequacy of the Corps' fiscal year 1975 draft environmental impact statement. EPA's region V, after review of the fiscal year 1975 draft statement, concluded that it adequately described the program's environmental impact.

The Department of the Interior; the Maritime Administration and the Assistant Secretary for Science and Technology, Department of Commerce; and the Department of Natural Resources, State of Michigan, in commenting on the draft statement, took the position that it did not fully evaluate the actual or potential environmental impacts of extended-season navigation. For example, several agencies specifically cited the omission in the impact statement of icebreaking and its impact on the environment.

In response, the Corps stated that the environmental impacts of icebreaking had been addressed in a Coast Guard environmental impact statement. However, EPA, in reviewing the Coast Guard impact statement, said that more complete information was needed to fully assess the environmental impact of icebreaking. The Coast Guard replied that it had tried to limit its impact statement to traditional Coast Guard icebreaking operations in the Great Lakes without reference to the extended navigation season program except in a very peripheral way. The Coast Guard stated that environmental impacts of icebreaking operations for the extended navigation season program were not considered because WNB was studying these impacts.

DISRUPTION OF ISLAND TRANSPORTATION

Winter transportation to and from the mainland has been recognized by the Corps as essential for residents of all islands in the system which are inhabited year round. We noted that during extended-season operations in the St. Marys River, the normal winter modes of island transportation, generally ferries, have been interrupted.

At Sugar Island, Michigan, which exemplifies the island transportation problem, the 300 residents normally depend on ferry service to Sault Ste. Marie, Michigan, for employment, schools, and essential supplies and services. The ferry service, which normally operates year round in a naturally ice-free area, has been interrupted for extended periods of time since the

start of the demonstration program.

The interruptions result from icebreaking activities which choke the ferry lane or docking slip with broken ice. (See photograph on p. 31.) In the third year of the demonstration program, the ferry missed about 50 percent of the 1,200 trips scheduled from January 1 to February 7, 1974 (the last day of extended-season operations for the 1973-74 season). This included 5 consecutive days when the ferry was unable to make any runs because of heavy ice conditions. It is interesting to note, however, that during the remainder of February, when extended-season operations were not taking place, the ferry missed only 23 percent of the 642 trips scheduled. The ferry operations were improved in the 1974-75 winter season.

WNB attributed the interruptions in service primarily to an underdesigned clutch. (See app. III.) WNB said that the clutch was rebuilt in the fall of 1974 and, as a result, ferry service had improved. WNB does recognize, however, that ferry service interruptions during the winter were quite minor before the demonstration program began. Also, as noted above, ferry service improved considerably in the 1973-74 winter after extended-season operations stopped even while the ferry was using the old clutch.

WNB has also been seeking a solution to the ferry problem at Sugar Island through other means, including emergency Coast Guard icebreaking assistance. However, in a future severe winter, the problem may arise again.

CONCLUSIONS

As discussed in this chapter, there are major unresolved issues which have an impact on the practicability of an extended navigation season on the Great Lakes-St. Lawrence Seaway. These issues concern the winter uses of the waterway by power and navigation interests, the need for an agreement between the United States and Canada, and an overall assessment of the expected environmental impacts of the project. These issues, which could also materially affect the project's economic feasibility (benefits and costs), should be resolved before a permanently extended-season program is initiated. Also, it would be desirable for the Corps to fully discuss the issues as well as the progress in resolving them in its budget submissions to the Congress.

RECOMMENDATIONS

We recommend that the Secretary of the Army direct the Corps of Engineers, which has overall responsibility for the demonstration program and the survey study, to



SOURCE: CORPS OF ENGINEERS
AERIAL VIEW OF SHIPPING CHANNEL IN ST. MARYS RIVER -
SUGAR ISLAND FERRY LANE CROSSES CHANNEL AT LOWER LEFT

- resolve, with the cooperation of IJC, if necessary, the problem between power and navigation interests;
- work, with the assistance of the Department of State as necessary, toward reaching an agreement with Canada on joint United States-Canadian participation in extended-season operations; and
- complete the overall assessment of the expected environmental impacts of extended-season navigation.

Because the issues may not be resolved before the expiration date of the demonstration program, we also recommend that the Corps establish a timetable for resolving them and keep the appropriate congressional committees informed of the progress made.

AGENCY COMMENTS

Department of the Army

The Department of the Army (see app. II) stated that a formal application to IJC for the testing of an ice control structure on the St. Lawrence River for further evaluation of the power-navigation problem was considered by WNB and rejected due to the demonstration report submission date imposed by the Congress. The Department added that resolving the legal and national issues is not an agency prerogative but rests with the Congress and that the legal committee's (see p. 21) report will be included in the final demonstration program report.

The Army added that reports issued to the Congress on the engineering, economic, and environmental feasibility of extending the navigation season will include the need for Canadian studies, actions, and participation as well as a complete overall assessment of the expected environmental impacts of an extended navigation season.

WNB

WNB agreed (see app. III) that the power navigation problem must be resolved. WNB stated that steps have been taken toward technical coordination with Canada and agreed that there is a need for a joint formal plan of action.

WNB also stated that the demonstration program was providing baseline data and findings on environmental impacts which would be used as the basis for an overall environmental impact statement.

cargo. Officials of the Corps' North Central Division said that these traffic projections were based on their judgment and that they did not have supporting documentation. They added that they had not had any studies or experience to draw on in preparing projections.

However, we noted that some studies projecting growth rates for various commodities had been made by different Government agencies, including the Corps itself. In matching the growth rates in these studies to Corps' projected growth rates used in the program's benefit-cost analysis, considerable differences were observed. In general, the benefit-cost analysis rates used by the Corps greatly exceeded those forecasted in the other studies, which translated into larger estimated benefits than would be the case if more conservative projections were used. The table on page 38 compares the Corps' projections with those in the other studies for three commodities.

Corps officials indicated that their growth projections were conservative because the best demographic indicator of aggregate demand ¹/ forecasted a 195-percent growth in total real income by 2000 in the areas served by the project; whereas, the Corps analysis is predicated on a growth of 156 percent by 2025 for the seven commodities used in the survey. However, the 195-percent growth rate included major growth in nonindustrial services (government, finance, insurance, and real estate). The agricultural, mining, and industrial areas--which include the seven commodities the Corps projected growth rates for--have much lower growth rates. For example, the Department of Commerce estimates that earnings from the mining of metals, including iron ore, will increase 58 percent by 2000.

Having arrived at aggregate projected demand, the Corps then estimated the percentage of this demand which would be transported during an extended season. Again the Corps officials stated that these estimates were judgmental and without documentation. The estimates varied substantially among commodities and time periods, but Corps personnel were not able to explain these variances.

¹Department of Commerce and Department of Agriculture, 1972 OBERS Projections, Series E, Economic Activity in the U.S., April 1974. The report was prepared for the Water Resources Council.

Growth Projections (base year--1971)

<u>Sources</u>	<u>1975</u>	<u>1985</u>	<u>2000</u>	<u>2005</u>	<u>2025</u>
<u>Iron ore:</u>					
Corps benefit-cost	20%	60%	(a)%	131%	201%
Origin-destination study (note b)	7	27	-	-	-
Domestic shipping analysis (note c)	11	37	96	-	-
Bureau of Mines circular (note d)	6	23	-	66	-
<u>Grain:</u>					
Corps benefit-cost	26	63	(a)	130	200
Origin-destination study (note b)	4	15	-	-	-
Deepwater port study (note e)	-	-	60	-	-
Domestic shipping analysis (note c)	14	38	93	-	-
Regulation of Great Lakes water levels study (note f)	11	35	52	-	-
<u>General cargo:</u>					
Corps benefit-cost	12	49	(a)	97	147
Regulation of Great Lakes water levels study (note f)	10	34	55	-	97

^aNo projection for that year.

^bCorps of Engineers, North Central Division, Origin - Destination Study of Bulk Commodity Movement - Upper Great Lakes Region (June 1972): The study projected a compound growth rate of 1.7 percent for iron ore and 1 percent for grain between 1970 and 1980 in the Upper Great Lakes region.

^cDepartment of Commerce, Maritime Administration, Domestic Waterborne Shipping Market Analysis (February 1974): A consultant study which evaluated the market for transportation on the Seaway System and evaluated the potential shipping market for five major bulk commodities. The projections shown are the market growths for domestic waterborne transportation of iron ore and cash grains.

^dBureau of Mines Information Circular 8461 (1970): The circular projects an average annual growth rate of 1.5 percent for iron ore.

^eCorps of Engineers, U.S. Deepwater Port Study (August 1972): The objective of the study was to provide an overall appraisal of the U.S. deepwater port needs.

^fInternational Great Lakes Levels Board, Regulation of Great Lakes Water Levels, Appendix E, Commercial Navigation (December 1973): The study described the effects of lake level fluctuations on commercial navigation interests in the Great Lakes-St. Lawrence Seaway System.

for protection against supply uncertainties during winter navigation. The Army also mentioned that (1) interest savings should be based on postponable costs rather than the market value of the stockpile, (2) interest savings should be based on the project rate of interest (5-5/8 percent) rather than an 8-percent rate, and (3) total savings should be the net of all increased costs resulting from a shift in the time of conveyance from normal season to extended season.

Vessel use savings

Vessel use savings were defined as savings realized when vessels are able to operate the whole year rather than being berthed for the winter. In addition to the greater productivity of fully used vessels, savings would also be realized when smaller, less efficient, vessels were eliminated. These smaller vessels now are needed to help the large vessels move 12 months of demand in a 9-month shipping season. The Corps used the transportation cost difference for coal and iron ore as vessel use savings. For the first year, the savings totaled \$12 million.

The Corps' projection of savings from replacing less efficient vessels was based on maximizing the use of larger vessels over a 12-month period. A consultant prepared the estimated composition of the expected vessel fleet; however, neither the Corps nor the consultant attempted to determine what plans the vessel owners had for their future fleets or whether the future vessels would be suitable for winter navigation. We believe the Corps should validate its assumptions with the vessel owners before claiming estimated savings from using more efficient vessels.

The Corps developed savings for coal and iron ore based on limited data. Specifically, one major steel company supplied the Corps with costs for tons of iron ore based on different vessel sizes. Although the Corps received the final costs from the company, the Corps was unaware of the methodology used to develop them and was unable to supply any supporting data. The costs for iron ore were converted to costs for coal based on the different volumes of the two cargoes.

We found that 300 million tons of coal and iron ore were erroneously included in the savings. Corps officials admitted that these tonnages related mostly to foreign vessels and were thus excludable when determining benefits accruing to the United States. These erroneous savings totaled almost \$2 million in the first year.

Also, savings of \$500,000 in the first year were erroneously included in the total because the same iron ore

was allocated to both vessel use and transportation savings. The Corps defines these two benefits as mutually exclusive.

Increased operating costs

Increased vessel operating costs due to weather and ice conditions are expected even with the plans of improvements costed out for the extended season. Increased operating costs reduce the savings obtained from waterborne transportation, reduced stockpiling, and vessel use.

Factors which would tend to increase winter vessel operating costs over normal season costs include crew, fuel, and insurance costs. A June 1972 report to the Congress by the Maritime Administration (see p. 5) on the impact of winter navigation on vessel insurance rates showed that the insurance cost alone might be so high as to keep shippers from using the extended season. There have not been any comparable studies on the impact of crew and fuel costs on winter operations.

To allow for increased expenses associated with winter operations, the Corps assumed that winter costs of water shipments would exceed normal costs by 30 percent. The assumed cost factor, however, was applied erroneously to the transportation savings and omitted in the computation of savings for stockpiling and vessel use.

In computing transportation savings the Corps, instead of adding 30 percent to the normal season water rate before comparing it to the land rate, reduced the total savings by 30 percent, or \$9.5 million. This method of computation tends to make all transportation savings incorrect.

For example, if we assume a land shipment cost to be \$10 a ton and the summer water cost to be \$7, there is a \$3 a ton savings. The Corps would then reduce the summer savings by 30 percent and calculate a winter savings of \$2.10 a ton. By the Corps' own assumption, the 30-percent increase should be applied to the summer water cost and not the savings. This would result in a winter cost of \$9.10 a ton, and the savings would be \$0.90 a ton instead of \$2.10.

QUESTIONABLE COSTS

The Corps labeled program costs as investment or operating costs. Investment costs covered such items as ice breakers, lock improvements, and land. Operating costs were for annual items, such as salaries, fuel, and placement of ice booms. The Corps estimated total investment costs necessary for an

extended season at \$192 million plus annual operating costs of \$9 million. We found that many of the Corps' cost estimates were questionable and that projected investment and operating costs might be considerably understated. Questionable estimates involved (1) bubblers, (2) traffic control systems, (3) lock improvements, (4) channel clearing devices, and (5) the use of nuclear powerplants.

Bubblers

The need for and workability of bubblers throughout the system is uncertain. Bubblers were considered for potential use in harbors, harbor entrances, and certain connecting channels to retard ice formation by bringing warmer bottom water to the surface. Bubblers are a primary compensating alternative to icebreakers; however, the Corps has determined only that bubblers work in one harbor and one part of one connecting channel. The Corps has not yet obtained the data necessary to determine whether bubblers will work in other locations. Also, the Corps did not have comprehensive data on the ice problems for 77 selected harbors with projected traffic and included bubbler costs for only 5 harbors in the benefit-cost analysis. Since bubblers or other alternatives would be needed for extended winter season operation at many locations, questions concerning the number and effectiveness of bubblers must be resolved before cost can be determined.

Traffic control system

The Corps, in making its cost estimates, used the least costly among several alternatives for moving traffic in the channel of the St. Marys River, without considering the constraining effect that this alternative could have on projected future traffic. The least costly alternative involved establishing a traffic control system for a one-way channel around Middle Neebish Island, as opposed to a more costly two-way channel.

The one-way channel could constrain the level of traffic movements. We found that traffic projections used in the benefit computations were untested for such constraints. Thus, the Corps should determine whether it would be appropriate to reduce traffic projections and related benefits or increase costs to provide the control system necessary to meet the traffic projections.

Lock improvements

The Corps included costs for only minor improvements in the Soo locks, even though only one of the four Soo locks is

capable of handling 1,000-foot vessels. (Anticipated benefits are based on maximum use of these larger vessels.) Further, traffic projections were based on the 1,000-foot lock being available during the entire extended season; however, the Corps must close down this lock for 1 month during this period for maintenance. The minor lock improvements included in the benefit-cost analysis were similar to those considered and rejected in another part of the system as being inadequate to sustain projected traffic. Including lock improvements at the Soo locks adequate to insure traffic projections could cause a large increase in estimated costs. If year-round traffic in 1,000 foot vessels is to be achieved, it is obvious that at least one 1,000-foot lock has to be open all year, which could entail building a second 1,000-foot lock or enlarging an existing smaller lock.

Channel clearing devices

Costs for two channel clearing devices included in the plans of improvements for the St. Lawrence River were not included in the analysis. The contractor, hired by the St. Lawrence Seaway Development Corporation to study the technical feasibility and cost of extending the navigation season in the St. Lawrence, said that these yet-to-be-developed devices would be necessary if the season were extended into the end of January or later. Initial investment costs and annual operating costs for these devices were estimated to be \$4 million and \$340,000, respectively.

Nuclear powerplants

The Corps' cost estimates did not consider the additional transmission costs associated with less than optimal locations of proposed nuclear powerplants. Traffic projections for the St. Lawrence Seaway were based on the placement of three nuclear powerplants at certain locations along the St. Lawrence River. These plants would operate year round and the heated discharges from these plants would be used for ice control purposes in the St. Lawrence River during the winter months. Both the Corps and a consultant have noted in their studies that the proposed plant locations may not be optimal from the standpoint of power production, thus increasing the cost of transmitting the power to customers. This additional cost should be included in the Corps' estimates.

AGENCY POSITION ON PRELIMINARY ECONOMIC ANALYSIS

The Department of the Army, in an August 14, 1974, memorandum to the Corps concerning the Corps' preliminary benefit-cost report, concluded that, on the basis of the economic

uncertainties of the preliminary analysis, the data should not be disseminated. The Army commented:

"As might be expected with a preliminary draft, the uncertainties seem to grow as one studies the report. All of the technical uncertainties have associated economic uncertainties. Moreover, many assumptions and procedures are not explained. For example, the fact that the increased cost of winter navigation has not yet been estimated is not noted in the report."

The Chief of Engineers said that a plan of study for completing the survey section of the program was under review. Included in this plan was a completely revised economic analysis scheduled to be completed by December 1975 and a study concerning the necessary cost-sharing investment of private, non-Federal, and Canadian interests. In November 1975 a Corps official said that the raw economic data was then available and was being compiled and analyzed.

The revised economic analysis was to include both a rate study and a traffic study. The rate study was to consist of a determination of the rate differential between the origin and destination of the various commodities by the Great Lakes-St. Lawrence Seaway and by overland modes of transportation. The traffic study was to include long-range forecasts of U.S. and Canadian traffic growth and employ interacting assumptions concerning (1) incremental extensions, (2) capacity of system locks and channels, (3) shifts in the domestic and ocean fleet vessel size and mix, and (4) trends in the costs and technology of competitive routings.

CONCLUSIONS

The benefit-cost analysis supporting the economic feasibility of a proposed project is an important part of the congressional and agency decisionmaking process and has become of increasing interest and concern to Members of Congress and to various groups of citizens.

We believe, therefore, that the benefit-cost analysis for extending the navigation season should realistically represent the expected conditions with and without the project and be fully documented and supported.

Although we could not fully quantify them, the benefits and costs questioned in our review, if not sustainable, could have a substantial impact on the project's economic feasibility. The items questioned concerned

- unsupported traffic projections and estimates of the percentage of traffic which would move during an extended season;
- including benefits for the St. Lawrence Seaway before it was expected to handle extended-season traffic;
- benefits claimed for traffic which would occur without an extended-season program;
- using inapplicable transportation rates;
- allocating the same commodity tonnages to both stockpile and transportation savings, which are mutually exclusive;
- not determining whether industries which own real estate for stockpiling would release it for other uses before including such changes in savings;
- including savings based on using larger vessels without determining what plans vessel owners had for their future fleets or whether future vessels would be suitable for winter navigation;
- possibly using unsupported data in computing vessel use savings;
- including savings attributable to foreign vessels;
- including the same tonnage in both vessel use and transportation savings, which are mutually exclusive;
- lack of specific information on increased vessel operating costs during the winter and incorrect application of the assumed factor for such increased costs; and
- use of cost estimates which may be considerably understated.

RECOMMENDATION

We recommend that the Secretary of the Army require the Corps, during its reanalysis of the benefit-cost computations, to resolve the questions raised in this report.



DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
 WASHINGTON, D.C. 20310

16 DEC 1975

Mr. Henry Eschwege
 Director, Resources and
 Economic Development Division
 U.S. General Accounting Office
 Washington, D.C. 20548

Dear Mr. Eschwege:

This letter is furnished on behalf of the Secretary of Defense in response to your request for comments on a draft report entitled "Federal Efforts to Extend the Winter Navigation Season on the Great Lakes and St. Lawrence Seaway--Status and Problems to be Resolved" (OSD Case #4180). The report is a comprehensive documentation of the Winter Navigation Demonstration effort and provides a very important objective analysis.

In our review of the draft report we have assumed that comments desired are from specific agency points of view. Our comments, which are attached as Inclosure 1, are generally relative to the Corps of Engineers area of responsibility and activities. I assume that other agencies will review the report in the same manner. The interagency Winter Navigation Board, chaired by the Corps, will comment separately.

We realize that all of the issues discussed in Inclosure 1 are problems which need to be resolved and, therefore, each will be addressed in the Survey Report.

The opportunity to review the draft report is appreciated.

Sincerely,


 Victor V. Veysey

Assistant Secretary of the Army
 (Civil Works)

1 Incl
 As stated



PROBLEM AREAS OF THE WINTER NAVIGATION PROGRAM
RELATIVE TO THE CORPS OF ENGINEERS

1. A substantial amount of waterborne traffic claimed by the Corps as a program accomplishment is not a direct result of program activities.

a. GAO concern that reported traffic in the extended navigation season must reflect only that resulting from program efforts is understandable. The Congress and the public need such accurate information to assess the prospective economic impact of extended season operations. In this regard, it has not been a goal of the winter activities program to generate traffic as an end in itself. The Winter Navigation Boards' Annual reports attempt to provide commercial data for the extended season factually and objectively. As noted in the GAO report, Corps' data provide the basis for GAO statistical analysis. The Third annual report states, for example, that approximately three-fourths of the total February and March traffic is from normal winter operations and is not creditable to the demonstration program. We are in agreement that, in as much as traffic is used as a measure of practicability, official Winter Board documentation provide as accurate a report of traffic resulting from program activities as can be obtained. Traffic studies now underway will be carefully developed to assure fully supportable estimates of prospective commerce for winter navigation.

b. The GAO report concerning discussion of factors affecting winter traffic, including the severity of weather, are relevant. Mild winter weather can be expected to contribute to expanded traffic and greater tonnage. Some of the traffic in the 1973-74 winter total could well be attributed to variances of weather.

c. Your recommendation has merit that the Corps include, in its funding requests and reports to the Congress, information on use of regular appropriations for Demonstration Program activities by all participating agencies. However, since the Demonstration Program will be completed by the end of this fiscal year, no more budget requests will be made until after recommendations in the Survey Report are possibly authorized. The Winter Navigation Board does report total funding in its annual activities program documents. Our reports to Congress will include a coordinated funding statement for the entire demonstration program.

2. Conflict between power and navigation must be resolved.

a. The Winter Navigation Board has worked toward resolving the power/navigation issue. It has funded efforts to determine what effects winter navigation would have on winter river conditions, a vital factor in hydropower generation, and how adverse effects could be minimized. A formal application to the International Joint Commission for the testing of an ice control

Department of Transportation

The Department of Transportation stated (see app. IV) that the problem of power and navigation interests is more apparent than real and centers more on the potential legal consequences of unsuccessful winter navigation on the St. Lawrence rather than the technical aspects of the compatibility of winter navigation and power.

The Department concurs that more formal coordination with Canada is needed and has taken steps toward technical coordination.

The Department of Transportation stated that additional environmental data collection and analysis were underway to provide a better basis for assessing both positive and negative environmental effects.

CHAPTER 4

PRELIMINARY ECONOMIC ANALYSIS DOES NOT

REALISTICALLY PORTRAY POTENTIAL BENEFITS AND COSTS

Benefit-cost analyses are developed and reported by Federal water resources agencies to show the economic feasibility of projects. Such analyses have become an important part of the congressional and agency decisionmaking process. Essentially, this analysis compares estimated annual benefits with estimated annual costs. Projects rarely are approved if their estimated costs exceed estimated benefits.

The Department of Transportation Act of 1966 (Public Law 89-670, October 15, 1966) required that each Corps navigation study include an estimate of savings to shippers from the improved waterway. This savings is computed by multiplying the volume of estimated waterway traffic by the difference between shipping rates for the improvement and the overland rates shippers were paying at the time of the study.

The River and Harbor Act of 1970, which authorized the demonstration program, required the Corps to make a survey study to determine the feasibility of extending the navigation season. The study is to consider, among other things, the cost of extending the navigation season, the related benefits, and the economic justification.

The Corps has completed a preliminary benefit-cost analysis for extending winter navigation on the Great Lakes-St. Lawrence Seaway. This analysis indicated a benefit-cost ratio of 7.1 to 1. We found, however, that the analysis contained errors, was partly based on assumptions and judgments without sufficient supporting documentation, and did not consider factors which could have major impacts on the economic feasibility of a permanent winter season navigation program.

While we recognize that the benefit-cost analysis is preliminary and as such is not the final analysis for the program, the reliability of such information is important because of the considerable emphasis currently being put on extending the winter navigation season. For example, the September 1974 issue of the Seaway Review, a non-Federal publication, claimed that the Corps' preliminary study had proven the feasibility and economic benefits of an extended season. This publication asserted that the national interest required the provision of funds to make an extended navigation season a reality and urged the Congress to approve a permanent extension of the winter navigation season on the upper four lakes.

PRELIMINARY BENEFIT-COST CALCULATIONS

In its preliminary benefit-cost analysis, the Corps prepared estimates for three alternatives--winter navigation (1) through January 31, (2) through February 28, and (3) throughout the entire year. The magnitude of the estimated benefits and costs (and associated benefit-cost ratio) for a year-round extension ^{1/} follows.

	<u>Totals projected</u>	
	<u>Traffic</u>	
	<u>(tons)</u>	<u>Benefits</u> <u>Costs</u>
	----- (thousands) -----	
Benefits:		
First year	27,003	\$ 68,223
Tenth year	45,211	140,824
Thirtieth year	64,603	196,555
Fiftieth (final) year	84,796	247,381
Average annual benefits		146,639
Costs:		
Total investment costs		<u>\$192,000</u>
Annual costs:		
Interest and amorti-		11,500
zation		
Operations and main-		<u>9,060</u>
tenance		
Average annual costs		<u>\$ 20,560</u>

Benefit-cost ratio:

$$\$146,639 \div \$20,560 = 7.1$$

The above benefits and costs are for year-round operations on the upper Great Lakes and operations through February 28 for Lake Ontario and the St. Lawrence River region. The period March 1 to April 1 is reserved for maintenance on the Welland Canal and St. Lawrence Seaway locks.

^{1/}This was the most favorable benefit-cost ratio. Those under alternatives 1 and 2 amounted to 5.3 to 1, and 6.9 to 1, respectively.

WNB has considered limiting the extended navigation season study to the upper four lakes where there are less technical problems. To date, the Corps has not prepared a benefit-cost analysis on the upper four lakes alone, but preliminary Corps data indicated that estimated benefits for the entire system would be reduced by 29 percent during the first year if the extended season were limited to the upper four lakes and estimated investment costs would go down by 14 percent.

The Corps' benefit-cost analysis considered only estimated U.S. benefits and costs. The Corps assumed that Canada would incur substantial costs and achieve considerable benefits for extending the season on the St. Lawrence River and the Lake Erie-Lake Ontario section but had not reached any agreement with the Canadians concerning their participation in such a program. (See pp. 22 to 23.)

QUESTIONABLE BENEFITS

The Corps considered transportation savings, stockpile savings, and improved vessel use as the three primary benefits of an extended-season program. The following table lists the benefits expected for the first year of an extended year-round program.

<u>Nature of savings</u>	<u>Estimated first-year benefits</u>	
	<u>Amount</u> (ooo omitted)	<u>Percent of total benefits</u>
Transportation savings	\$22,323	33
Stockpiling savings:		
Interest on invested capital	22,953	34
Real estate	5,767	8
Handling costs avoided	4,802	7
Increased vessel use	<u>12,378</u>	<u>18</u>
Total estimated savings	<u>\$68,223</u>	<u>100</u>

The Corps made projections of traffic growth that might be expected from an extended season and applied to these volume figures unit savings (the difference between water and alternative rail and truck shipment costs) to arrive at estimated transportation savings.

Traffic projections

The Corps made annual projections of the growth in shipments for seven commodity groups--grain; coal; petroleum; cement, stone, sand, and gravel; iron ore; other bulk cargo; and general

Also, the Corps estimated how much traffic would move during each increment of an extended season on the basis of the assumption that traffic would decrease as the severity of the winter increased. The estimates derived by the Corps were:

<u>Period</u>	<u>Estimated percent of winter traffic</u>
Dec. 15 to 31	20
Jan. 1 to 31	35
Feb. 1 to 28	25
Mar. 1 to 31	20

In an attempt to verify its estimates of the amount of traffic to be moved during the winter and in each increment of an extended season, the Corps, in 2 successive years, sent a survey questionnaire to 100 shipping companies to determine the amount of traffic which would be shipped and during what time. Corps officials said that only 17 responses were received and that the survey had been of little use in refining their estimates.

Total estimated savings

The total benefits were projected for a 50-year period and amounted to \$68 million for the first year of the program. Included in the first-year benefits was almost \$18 million for traffic on the St. Lawrence River. Because the St. Lawrence was not considered navigable in the extended season until the ninth year of the program, these benefits should not be included in first-year benefits.

Transportation savings

The Corps defined transportation savings as the savings that would be realized through using water shipment in the winter rather than the more expensive land shipments. Transportation savings were computed by multiplying the projected tonnage to be shipped in the winter by the difference between the land and water shipping rates. The Corps estimated transportation savings of \$22 million for the first year of the program.

We found that (1) savings were claimed for traffic that would move year round without a program and (2) inapplicable transportation rates were used.

The Corps included savings for the winter movement of petroleum tonnage even though most of the shipments were made in areas of Lake Michigan where winter traffic normally

occurs. These intralake shipments would be made regardless of an extended-season program. These savings amount to about \$3.4 million for the first year.

The Corps, in calculating the differences in transportation costs for most commodities, generally used readily available information--rates applicable to traffic moving between Lake Erie and Lake Ontario. However, in the case of grain--where 91 percent of the traffic does move between Lakes Erie and Ontario--the Corps did not use the rate for this area. Instead, it used a cost savings of \$6 a ton for grain rather than the \$1.81 a ton savings applicable to Lake Erie-Lake Ontario traffic. This overstated the savings on grain movement by about \$4 million.

Stockpile savings

The Corps defined stockpile savings as benefits realized when industries can receive shipments during the winter months rather than building up inventories in the fall to last through the winter. This benefit basically consisted of the savings of interest on investment in stockpiles, the reduced handling costs when stockpiles were eliminated, and the release of real estate for uses other than for stockpiles. The Corps calculated the total benefit for the two stockpiled commodities, coal and iron ore, over the projected life of the program. The Corps estimated savings of \$34 million for the first year of the program.

The Corps allocated iron ore tonnage between stockpile savings and transportation savings. These savings are mutually exclusive by definition; if a commodity is moved overland in winter, it is not stockpiled, and if it is stockpiled, it is not moved overland. The Corps, however, allocated some of the same iron ore tonnage to both savings. This resulted in the duplicate allocation of over 100 million tons during the 50-year projection. This dual allocation accounted for \$1.5 million in benefits during the first year of the program.

We noted that the release of real estate used for stockpiling accounted for about 11 percent of iron ore and 53 percent of coal stockpile savings. The rates used in computing real estate savings were based on ground storage charges. Although these savings were based on long-range industry plans, the Corps had made no studies to determine whether industries which used their own real estate for stockpiling would release it for other more productive uses.

The Department of the Army, after reviewing the Corps calculations of stockpiling savings, concluded that savings should be based on reductions in stockpiling needs, assuming that a certain amount of stockpiling would still be required

AGENCY COMMENTS

WNB advised us (see app. III) that traffic and benefits could not be fully developed until specific alternatives for an extended season had been defined and operating conditions determined. WNB and the Department of the Army (see app. II) said that the questions would be resolved by the economic studies now being made and would be reported in the feasibility report for extended-season navigation.

CHAPTER 5

SCOPE OF REVIEW

We reviewed documents, records, and studies available at the Corps' North Central Division, Chicago, Illinois, and interviewed officials of public and private agencies and organizations having direct or indirect responsibilities or interests in the program. The activities we visited or contacted are listed below.

Army Corps of Engineers:

Office of the Chief of Engineers, Washington, D.C.
North Central Division Office, Chicago, Illinois
District Offices
Detroit, Michigan
Area Office, Sault Ste. Marie, Michigan
Buffalo, New York
Cold Regions Research Engineering Laboratory,
Hanover, New Hampshire

Artec Incorporated, Columbia, Maryland
(contractor consultant to Saint Lawrence Seaway
Development Corporation)

Edison Sault Electric Co.,
Sault Ste. Marie, Michigan
(hydroelectric company on St. Marys River)

Environmental Protection Agency, region V
Chicago, Illinois

Great Lakes Basin Commission
Ann Arbor, Michigan

Great Lakes Commission
Ann Arbor, Michigan

International Joint Commission
U.S. Engineer Advisor, Washington, D.C.

Lake Carriers Association
Cleveland, Ohio

Maritime Administration
Division of Great Lakes Shipping
Washington, D.C.

National Oceanic and Atmospheric Administration
Great Lakes Environmental Research Laboratory
Ann Arbor, Michigan

Poirier Marine, Inc.
Sault Ste. Marie, Michigan
(company provided ferry transportation services
to residents of Sugar Island in the St. Marys River)

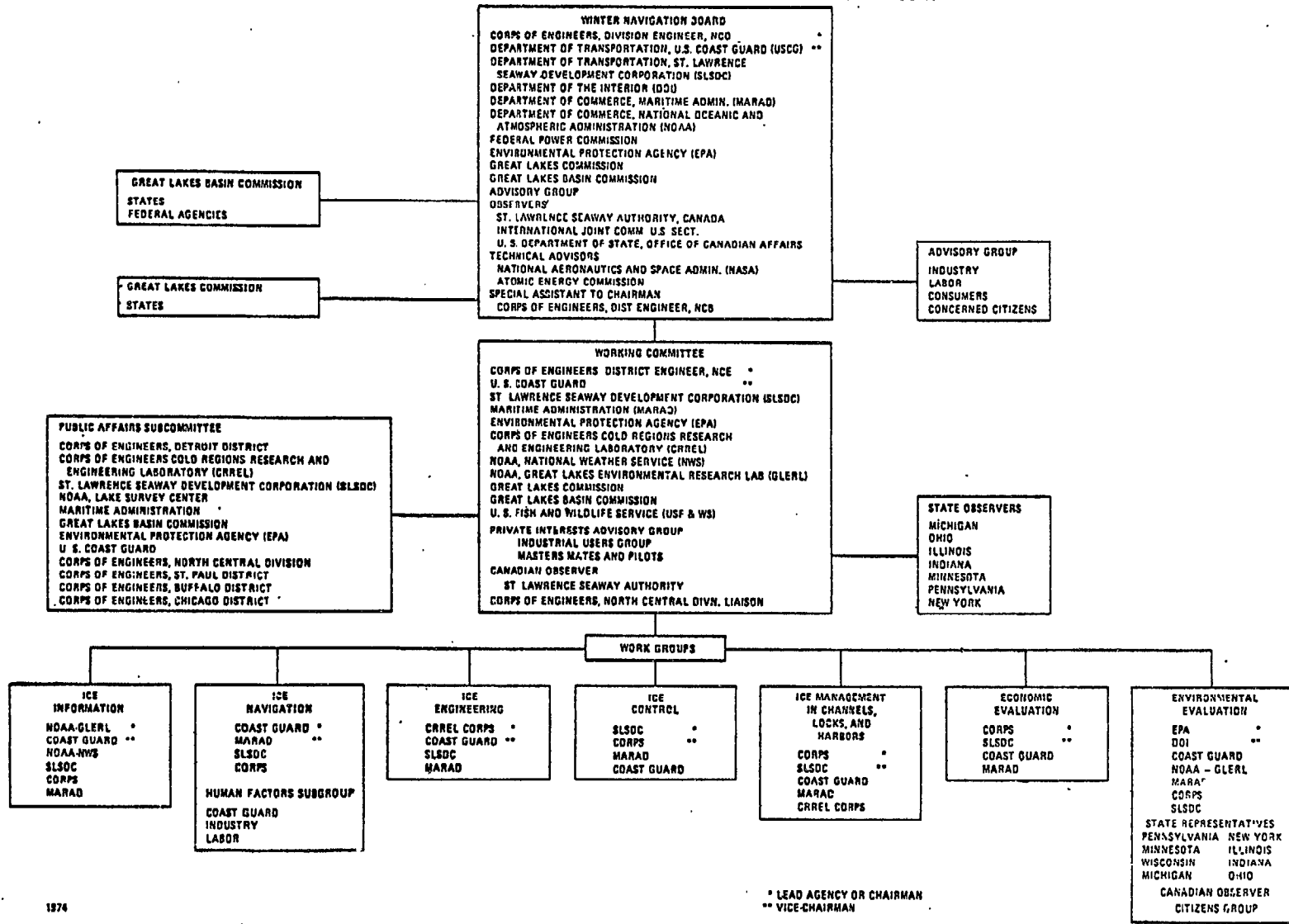
Power Authority of the State of New York
Resident Manager for the St. Lawrence Hydro Electric
Power Project, Massena, New York

St. Lawrence Seaway Authority
Cornwall, Ontario, Canada

St. Lawrence Seaway Development Corporation
Office of Comprehensive Planning
Washington, D.C.

U.S. Coast Guard:
Headquarters Office, Washington, D.C.
Ninth Coast Guard District, Cleveland, Ohio
Captain of the Port, Sault Ste. Marie, Michigan

ORGANIZATION CHART
GREAT LAKES - ST. LAWRENCE SEAWAY NAVIGATION SEASON EXTENSION PROGRAM



* LEAD AGENCY OR CHAIRMAN
** VICE-CHAIRMAN

50

structure on the St. Lawrence River for further evaluation relating to the power/navigation problem was considered by the Board and rejected due to the demonstration report submission date imposed by Congress. In addition, the Board established a legal committee to define the legal aspects associated with the St. Lawrence River. Its report will be included in the final Demonstration Program Report.

b. Resolution of the legal and national issues is not an agency prerogative, but rests with the Congress. Agencies will report on the needs, the issues and the indicated action. The U.S. Department of State and the International Joint Commission are continually advised of all matters relative to all programs, and particularly those in international waters.

3. Lack of a coordinated plan of action with Canada.

The need for a total program, United States and Canada, is understood by the Congress and by the participating public and private interests. Congress provided for this by (1) directing that the Demonstration Program determine means and methods of extending the Navigation Season, and (2) reporting on the engineering, economic and environmental feasibility of extending the Navigation Season. All of this can be quantified and reported to Congress as a United States program. The reports will address the need for Canadian studies, Canadian actions and Canadian participation. Coordination now provides for complete exchange of each country's ongoing efforts and findings. Programs are carried out mutually wherever possible, such as in ice breaking and surveillance.

4. Potential environmental damage.

The Corps will submit with its Survey Report a complete overall assessment of the expected environmental impacts of an extended season navigation. This report is presently scheduled to be completed in June 1977.

5. Preliminary economic analysis is not realistic.

Preliminary benefit/cost data as well as several economic items regarding the justification of an extended season are being studied as a part of the Survey Report. These items will be resolved by the economic studies now being conducted and will be reported in the Survey Report.



NCDPD-N

DEPARTMENT OF THE ARMY
 NORTH CENTRAL DIVISION, CORPS OF ENGINEERS
 536 SOUTH CLARK STREET
 CHICAGO, ILLINOIS 60605

10 December 1975

Mr. Henry Eschwege, Director
 United States General Accounting Office
 Washington, D.C. 20548

Dear Mr. Eschwege:

Thank you for your letter of 30 September 1975, providing me your draft report entitled Federal efforts to extend the winter navigation season on the Great Lakes and St. Lawrence Seaway--Status and Problems to be Resolved. I welcome the opportunity to review your report and to comment on it.

I understand that participating Agencies have also been given the draft report for their independent review and comment. For this reason my comments will primarily address the activities and areas of interest for which the Corps of Engineers has primary management responsibility. Board Members have had the opportunity to review my reply and to discuss it with me. In this regard, I support the proposal made by Mr. Chuday, to meet with your staff to discuss these comments. I understand it has been agreed to hold the meeting in my office on 11 December 1975. I have informed members of the Winter Navigation Board of the meeting, should they wish to attend or be represented.

Your report has taken exception to six major areas of the winter navigation program. My comments address these six areas. They also include some additional detailed facts and views noting errors and suggested wording changes. Your conclusions, and my comments on each follow:

Substantial amounts of waterborne traffic claimed by the Corps as a program accomplishment is not a direct result of program activities.

Comment - (a) Traffic: If this impression is presented, it was not intended. The Third Annual Report states, that approximately three-fourths of the total February and March traffic normally occurs and is not creditable to the Demonstration Program. It has not been a goal of the winter Demonstration Program to generate traffic as an end in itself, but traffic is used as a measure of practicability and documentation will provide as accurate a report of traffic, resulting from program activities, as can be obtained.



APPENDIX III

APPENDIX III

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Mr. Henry Eschwege

10 December 1975

In addition, studies now underway for the Feasibility Report, will be carefully developed to assure supportable estimates of potential future traffic.

Comment - (b) Weather Severity: We agree that the severity of winters during the Demonstration Program have not been extreme. Consequently, it has not been possible to conduct our tests and obtain data under coldest conditions. However, our estimates on what the expected results would have been under such conditions will be discussed in our final report. Because of the ambiguity that may exist in the terms that define the severity of a winter, we contend that the winters have been relatively normal and the word "mild" is not descriptive. The 74-75 winter season on Lake Superior and at the Soo was considered normal, as in terms of freezing degree days it was within one standard deviation of the mean.

Conflict Between Power and Navigation Must be Resolved.

Comment: We agree that the conflict must be resolved. The Board has established a legal committee to address these problems. The Seaway Development Corporation, also, under its statutory authority, is addressing legal and technological issues. Resolution of the legal aspects may rest with the Congress.

Lack of Coordinated Plan of Action with Canada.

Comment: The Winter Navigation Board has effected coordination which provides for complete exchange of each country's ongoing efforts and findings. Programs, such as icebreaking and surveillance, are carried out mutually. There is need for a formal plan of action, jointly with Canada. Steps have been taken toward technical coordination.

Potential Environmental Damage.

Comment: The Corps will submit with its Feasibility Report a complete statement of the expected environmental impacts of extended season navigation. The Demonstration Program is providing base line data and findings on environmental impacts as the basis for the overall statement.

Preliminary Economic Analysis is not Realistic.

Comment: The preliminary economic data provided a first look at the economics. Until specific alternatives for extended season are defined, and operating conditions are determined, traffic and benefits will not be fully developed. Benefit/cost data as well as several other economic items regarding the justification of an extended season are being studied as a part of the Feasibility Report. These items will be resolved by the economic studies now being conducted and will be reported in the Feasibility Report.

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Total Program Funding is not Reported to Congress.

Comment: We agree a coordinated budget may have been appropriate. The Winter Board has displayed total funding in its annual activities documents; however, these reports have not been transmitted to Congress for record purposes. Our final Demonstration Program report to Congress will include a coordinated funding statement for the entire Demonstration Program.

ADDITIONAL, DETAILED, COMMENTS ON GAO DRAFT REPORT

[See GAO note, p. 63.]

Statement - Page 10, Paragraph 1.

Shippers are handicapped in attempting to operate beyond January 31, since most of their fleets consist of old vessels that have not been strengthened for winter operation.

Comment: To the extent that any fleet is still operating old, lower-powered, understrengthened lake boats, they are handicapped in winter operations. These companies are encouraged not to operate. However, it should be noted that the new vessels being build are ice-strengthened and high powered, as companies have recognized the need to be able to operate in the winter.

[See GAO note, p. 63.]

Statement - Page 11, Paragraph 3.

One of the most significant factors accounting for extended winter operations has been the change in the Coast Guard's icebreaking policy in fiscal year 1969.

Comment: This should be "policy since fiscal year 1969." The Coast Guard has changed their icebreaking emphasis by assigning more ships to the St. Mary's area than in previous years and by concentrating on preventive icebreaking. This has included anticipation of ship passages and pre-breaking and shaping of channel turns.

[See GAO note, p. 63.]

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10 December 1975

Statement - Page 12, Paragraph 3, 2d sentence.

An operational plan developed to curtail shipping, if conditions became too severe in the St. Marys River, was not used.

Comment: The operational plan was used during the entire winter. Five-day forecasts, on an experimental basis, were prepared and distributed daily throughout the winter. Since these forecasts never indicated that the Sugar Island ferry service would be interrupted for a five-day period, it was not necessary to stop shipping.

[See GAO note, p. 63.]

Conclusion - Page 13, Paragraph 2.

Traffic accomplishments claimed by the Corps as a result of the demonstration program included a substantial amount of traffic which was not primarily due to program activities.

Comment: Traffic not sensitive to program accomplishment, such as intra-lake traffic and Lake Huron-Lake Erie traffic, will not be included in traffic calculations.

Statement - Page 16, Paragraph 1, 4th sentence.

Passage of vessels requires icebreaking.

Comment: Although the passage of vessels in the St. Lawrence River will require icebreaking, stable ice conditions will also be required for both power and navigation interests.

Statement - Page 17, Paragraph 1.

There is also a related problem involving the disruption of transportation to and from inhabited islands in the St. Marys River.

Comment: Measures to resolve problems have been demonstrated. Measures to completely solve the problem will be fully addressed in the Feasibility Report.

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Statement - Page 21, Paragraph 2, last sentence.

The adequacy of the test site at Copeland Cut was not adequately explored.

Comment: The Copeland Cut test site was compared to many other potential sites on the river. One of the primary reasons it was selected was the safety factors it provided against disruption of levels and flows.

Statement - Page 28, Paragraph 2, last sentence.

The Corps anticipates that a permanent extended navigation season program would cause extensive shoreline property damage in the St. Clair River area.

Comment: The Corps does anticipate shoreline property damage in the St. Clair River if a permanent extended navigation season program is implemented. Measures to provide mitigation for possible damages are considered appropriate and will be recommended in the Feasibility Report.

Statement - Page 28, Paragraph 3, 1st sentence.

The risk of pollution from oil spills will be increased because, for the most part, vessels are not designed to operate in icy conditions.

Comment: The ship pollution statements appear to be the result of a misunderstanding. The risk of pollution during the winter is obviously greater with navigation as opposed to without navigation. While both the Coast Guard Draft EIS on domestic icebreaking and the Corps EIS on the program describe a "greater" risk of pollution, this increased risk is described as minimal because of the LAKER fuel tank arrangement and type of damage normally suffered. Further, as noted on page 45 of the report, most petroleum products move in Lake Michigan, where ice is not prohibitive.

Statement - Page 30, Paragraph 2.

The Environmental feasibility of using heated effluent water to maintain relatively ice-free channels is questioned.

Comment: Recognition of changed environmental conditions is one of the primary reasons for conducting the Saginaw Bay thermal ice suppression test. The WNB has funded the USF&WS to collect base line environmental data for the past three years to determine existing environmental conditions. After the actual test this winter, an environmental analysis of the effects of the system will be made.

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10 December 1975

Statement - Page 31, Paragraph 1, last sentence.

There is a need for extensive test and evaluation of thermal ice suppression rather than the very limited testing presently being done.

Comment: Such a judgement is considered premature. Results of the limited test will form the basis for determining requirements and recommendation for further testing in a permanent extension of the shipping season.

Statement - Page 32, Paragraph 4, 2d sentence.

EPA, in reviewing the Coast Guard EIS, stated more complete information was needed to fully assess the environmental impact of icebreaking.

Comment: The environmental impact of icebreaking will be fully addressed in the EIS for the Feasibility Report.

Statement - Page 33, Paragraph 3.

The ferry serviced about 50 percent of the trips scheduled in January and February of the third year of the Demonstration Program.

Comment: The following more complete information may be helpful. The ferry owner indicated to the Corps in his report '73-74 winter operations that out of the 1,856 ferry trips scheduled during January and February 1974, 1,111 were completed (or 40% missed). Interruptions were primarily due to the underdesigned clutch. The clutch was rebuilt in the fall of 1974 with funds contributed by both the WNB and shipping industry. As a result of this modification, ferry service was interrupted because of ice conditions on only six days during the entire '74-75 season. On each of these six days at least 50% of scheduled trips were made. Prior to extended season operation, ferry services was curtailed about 2 days per winter season due to ice conditions.

Conclusion - Page 40, Paragraph 1.

Officials of Corps North Central Division told us that these traffic projections were based on their judgment and that they did not have supporting documentation. They added that they had not had any studies or experience to draw on in preparing projections.

Comment: Please note that the Great Lakes-St. Lawrence Seaway Navigation Economics Systems Study currently underway is documenting all secondary sources of projection as well as expert judgment evaluation by personnel of A. T. Kearney, Incorporated. This current work will replace the early analysis.

Conclusion - Page 44, Paragraph 3.

Because the St. Lawrence was not considered navigable in the extended season until the ninth year of the program, these benefits should not be included in first year benefits.

Comment: We agree. Season extension benefits will not be counted until the appropriate part is operational. Both geographic and time phasing will be an integral part of the analysis and the results will be provided in Feasibility Report.

Conclusion - Page 45, Paragraph 1.

We found that (1) savings were claimed for traffic that would move year-round without a program, and (2) inapplicable transportation rates were used.

Comment: (1) We agree. See response to GAO Conclusion on page 13. (2) A transportation rate study summarized in punch card format is the new basis for transportation savings. The data base will be less susceptible to misinterpretation by both the users and reviewers. This information will be provided in Feasibility Report.

Conclusion - Page 46, Paragraph 1.

The Corps allocated iron ore tonnage between stockpile savings and transportation savings. The Corps, however, allocated some of the same iron ore tonnage to both savings.

Comment: We agree. The unit train tonnage alternative was not allocated properly and was double counted in the previous feasibility study. The current study methodology makes a definite separation of tons that would have either transportation or stockpiling savings.

Conclusion - Page 46, Paragraph 2.

The rates used in computing real estate savings were based on ground storage charges. Although these savings were based on long-range industry plans, the Corps had made no studies to determine whether industries which use their own real estate for stockpiling would release it for other more productive uses.

Comment: We plan to contact companies to determine their intent and to define the best means of estimating these savings.

Conclusion - Pages 46 and 47.

The Department of the Army, after reviewing the Corps calculations of stockpiling savings, concluded that savings should be based on reductions in stockpiling needs assuming that a certain amount of stockpiling will still be required for protection against supply uncertainties during winter

NCDPD-N

10 December 1975

Mr. Henry Eschwege

navigation. The Department of the Army also mentioned that the (1) interest savings should be based on postponable costs rather than the market value of the stockpile, (2) interest savings should be based on the project rate of interest (5-5/8 percent) rather than an 8 percent rate, and (3) the total savings should be net of all increased cost resulting from a shift in the time of conveyance from normal season to extended season.

Comment: Current feasibility study calculations contain documented assumptions on the need for an emergency baseline stockpile throughout the normal season as well as the winter navigation season.

Interest savings will be based upon postponable capital investment in the stockpile. Savings will be calculated in units of ton months saved converted to a dollar value. Interest savings are being calculated at the current rate of 6-1/8 percent. Stockpiling savings will be calculated for iron ore, coal, and iron and steel imports. Arctec, Incorporated, has shown decreased costs for movement of iron ore and coal in the extended season and increased costs for movement of iron and steel imports. The total stockpile savings will be adjusted to account for these changes in the winter transportation costs of these affected commodities to the stockpile point.

Conclusion - Page 48, Paragraph 1.

We believe the Corps should validate its assumptions with the vessel owners before claiming estimated savings from the use of more efficient vessels.

Comment: We agree, and are obtaining documentation of future vessel fleet and vessels suitable for winter navigation as part of the Great Lakes-St. Lawrence Seaway Navigation Economics Systems Study.

Conclusion - Page 57.

It is concluded that the benefit values and costs questioned, if not sustainable, could have a substantial impact on the project's economic feasibility.

Comment: We agree and are preparing well substantiated revised benefit and cost estimates.

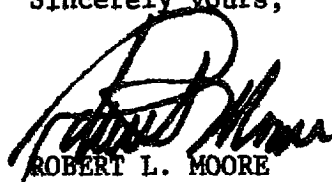
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10 December 1975

Mr. Henry Eschwege

I have provided the comments herein with the view to assuring the areas of investigation, for which I have responsibility, be as factual and complete as possible. I very much appreciate the opportunity to make these comments.

Sincerely yours,



ROBERT L. MOORE
Brigadier General, USA
Chairman, Winter Navigation
Board

GAO note: Deleted material suggests changes which have been incorporated in the report.

Note: Page references in this appendix refer to our draft report and may not correspond to the pages of this final report.



OFFICE OF THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

ASSISTANT SECRETARY
FOR ADMINISTRATION

December 8, 1975

Mr. Henry Eschwege
Director
Resources and Economic Development
Division
U. S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Eschwege:

This is in response to your letter dated September 30, 1975, requesting our comments on the General Accounting Office's (GAO) report on Federal efforts to extend the winter navigation season of the Great Lakes and the St. Lawrence Seaway. During the four years of the program to show the feasibility of extending the navigation season, winter traffic has been extended in some of the Great Lakes. GAO believes there are major problems which must be resolved before conclusive judgments can be made as to the practicability of a permanent extended navigation season. These are (1) a conflict between the power and navigation interests, (2) a lack of coordinated plan of action with Canada, and (3) potential environmental damage. The program's preliminary economic analysis does not realistically portray the potential benefits and costs of a permanent extended navigation season program.

While the Department of Transportation concurs with much of the report in general, it believes the findings and recommendations need clarification and modification. We endorse the recommendation that the economic analysis should more realistically portray costs and benefits of an extended navigation season. We believe that the referenced conflict between power and navigation interests is more apparent than real and centers more on the potential legal consequences of unsuccessful winter navigation on the St. Lawrence River rather than the technical aspects of the compatibility of winter navigation and power. We concur in the need for more formal coordination

with Canada, and have taken steps toward technical coordination. Additional environmental data collection and analyses are underway in order to provide a better basis for assessing both positive and negative environmental effects.

I have enclosed two copies of the Department's reply to the report.

Sincerely,


William S. Heffelfinger

Enclosure
(two copies)

DEPARTMENT OF TRANSPORTATION REPLY
TO
GAO DRAFT REPORT OF SEPTEMBER 30, 1975
ON
FEDERAL EFFORTS TO EXTEND THE
WINTER NAVIGATION SEASON ON THE
GREAT LAKES AND ST. LAWRENCE SEAWAY --
STATUS AND PROBLEMS TO BE RESOLVED

SUMMARY OF GAO FINDINGS AND RECOMMENDATIONS

The report describes the results of a GAO audit of the first four years, FY 71-74 of the six year, multi-agency, "Great Lakes - St. Lawrence Seaway Navigation Season Extension Demonstration Program," authorized by Congress in the River and Harbor Act of 1970 and extended by the Water Resources Development Act of 1974. The lead agency for the program is the U.S. Army Corps of Engineers. Program policy is determined by a Winter Navigation Board, chaired by the Corps of Engineers. The U.S. Coast Guard and the St. Lawrence Seaway Development Corporation are both represented on the Board and participate in the program.

The GAO findings may best be summarized by quoting directly:

"During the 4 years of the program to show the feasibility of extending the navigation season, winter traffic has been extended in some of the Great Lakes, however, a substantial amount of traffic claimed as program accomplishments by the Corps is not a direct result of program activities.

"There are major problems which must be resolved before conclusive judgments can be made as to the practicability of a permanent extended navigation season on the Great Lakes and St. Lawrence Seaway. These are (1) a conflict between power and navigation interests, (2) a lack of a coordinated plan of action with Canada, and (3) potential environmental damage.

"The program's preliminary economic analysis does not realistically portray the potential benefits and costs of a permanent extended navigation season program."

The Draft Report contains four specific recommendations, quoted below. It should be noted that each recommendation deals with a proposed direction for action by the Corps of Engineers from the Secretary of the Army.

Recommendation 1

"We recommend that the Secretary of the Army direct the Corps of Engineers to reevaluate its procedures for determining traffic claimed as demonstration program accomplishments. These accomplishments should be only those which are a direct result of the demonstration program. The Corps should use a starting date for the calculation of program accomplishments which better reflects pre-program Soo lock closing dates and a method for eliminating those shipments which would occur without a program."

Recommendation 2

"We recommend that the Secretary of the Army require the Corps to include information in its funding requests and reports to the Congress on all participating agencies' use of their regular appropriations for demonstration program activities."

Recommendation 3

"We recommend that the Secretary of the Army direct the Corps of Engineers, which has overall responsibility for the demonstration program and the survey study, to:

- seek, with the cooperation of the IJC, resolution of the conflict between power and navigation interests;
- work, with the assistance of the State Department as necessary, toward reaching an agreement with Canada on joint United States-Canadian participation in extended season operations; and
- complete the overall assessment of the expected environmental impacts of extended season navigation."

Recommendation 4

"We recommend that the Secretary of the Army require the Corps, during its reanalysis of the benefit-cost computations, to resolve the questions raised in this report."

SUMMARY OF DEPARTMENT OF TRANSPORTATION POSITION

While the Department of Transportation concurs with much of the report in general, it believes the findings and recommendations of the draft report need clarification and modification. We feel that the referenced

conflict between power and navigation interests is more apparent than real and centers more on the potential legal consequences of unsuccessful winter navigation on the St. Lawrence River rather than the technical aspects of the compatibility of winter navigation and power. We concur in the need for more formal coordination with Canada, and have taken steps toward technical coordination. Additional environmental data collection and analyses are underway in order to provide a better basis for assessing both positive and negative environmental effects.

POSITION STATEMENT

Reference is made on the cover page, and on pages 16, 17, 20, and 22 to "a conflict between power and navigation interests." The draft report exaggerates the differences between the power interests and the navigation interests relative to season extension. As a practical matter, navigation and power have similar requirements for winter operations. It is essential to both that winter levels be maintained and that no impediments to the flow of the river be created. The question presently being addressed by the Season Extension program is how this mutual requirement can best be accomplished. Traditionally, the power entities have installed the so-called ice booms across the St. Lawrence River at the conclusion of the navigation season. These installations impede the surface flow of the river and enhance the formation of a stable ice cover. Much of the work of the season extension demonstration program has been directed toward developing a technology by which this phenomenon can be preserved at the same time a navigation channel is maintained.

The legal questions will in all probability be resolved by satisfactory resolution of the technical problems. The legal questions that have been posed by the power entities are for the most part directed at questions which would be presented by a failure of the technology. While these need to be addressed and resolved, it is unlikely they will ever be more than academic questions.

The report also accepts without question the Corps of Engineers' determination that the approval of the International Joint Commission will be required for an extended navigation season. The original navigation improvements on the St. Lawrence River were accomplished by means of an exchange of diplomatic notes between the governments of the two countries which authorized their construction and operation in accordance with the enabling status of the respective Seaway entities. This is an open-ended approval under which the Seaway entities have been operating and which appears to be sufficiently comprehensive to include the Season Extension program.

With respect to the last paragraph on page 19, it should be pointed out that although the Seaway and Power project was not expressly designed for winter navigation, neither was there any express exclusion of winter navigation.

Beginning on page 24, the report addresses a lack of coordination with Canada on season extension. Although funding for a parallel, multi-agency Canadian effort was not approved, the St. Lawrence Seaway Authority has proceeded with its own in-house efforts, which have been fully coordinated with the Seaway Development Corporation at the working level. Because of its statutory authority operating responsibilities, the Seaway Development Corporation is more properly the U.S. agency to coordinate with Canada on season extension.

The most significant inaccuracy in the report, regarding Coast Guard operations, is the discussion on pages 11 and 12 which indicates that a major change was made to Coast Guard icebreaking policy because of the demonstration program, and that this change has had a major impact on the success of the program. The current icebreaking policy was not developed because of the demonstration program. With the transfer of the Coast Guard from the Department of Treasury to the Department of Transportation on 1 April 1967 all Coast Guard program policies were examined to determine if they were in keeping with current national economic goals and national transportation system objectives. It was established that icebreaking in support of maritime commerce is a legitimate concern for the Department of Transportation and the U.S. Coast Guard. An in-house study in 1968 concluded that the present Coast Guard and national policy on domestic icebreaking was not acceptable in view of the current national economic goals, transportation system objectives. The Commandant then promulgated the Domestic Icebreaking Policy on 1 April 1970, well before the start of the demonstration. During the course of the demonstration there has been a steady increase in maritime commerce during the winter season. It is anticipated that the shipping industry will continue to strive for increased vessel utilization. Therefore, with regard to the possibility of retrenchment as stated on page 12, everything else remaining equal, it is likely that the requirement for Coast Guard ice operations will not significantly diminish, regardless of the outcome of the demonstration program.

[See GAO note 1, p. 72.]

There are other statements in the report which, although not necessarily incorrect or misleading, deserve amplification. The following comments apply:

a. Page 8, para. 3 - Better weather and ice information and improved freeze-up forecasts provided by the demonstration program have formed the basis for changes in the Seaway's closing dates, although only of a few days.

b. Page 10, para. 1 - To the extent that any fleet is still operating old, lower-powered, understrengthened laker it is handicapped in winter operations. However, the new vessels being built are ice-strengthened and high-powered.

[See GAO note 1, p. 72.]

e. Page 17, para. 1 - The problem of disruption of ferry service at Sugar Island has been minimized. This was accomplished by strengthening the ferry, improving its clutch system, putting bubblers in the slip, dial-a-ride service and improved parking plus assistance with Coast Guard tugs when needed. Further plans for an ice boom and a new slip this year should virtually resolve this problem.

[See GAO note 1, p. 72.]

h. Page 20, para. 1 - The navigation entities as well as the power companies consider the use of ice booms to form a stable ice cover an essential part of regulating winter flows.

i. Page 20, para. 4 - The Power Authority prohibited experimentation or operation with the modified gate in ice conditions until the Authority was relieved of its liability for damage due to such operations. A successful test was accomplished with the gate in open water conditions.

The Corporation and the Winter Navigation Board have deferred any applications to IJC until sufficient engineering data from field tests and model studies are available.

[See GAO note 1, p. 72.]

k. Page 25, para. 4 - The Canadian "earlier spring" plan is but one of a number of alternatives under consideration by the St. Lawrence Seaway Authority. International coordination on navigation season extension is currently being provided primarily by means of a joint technical committee on season extension and through regular operational contacts between the two Seaway operating agencies.

l. Page 28, para. 3 (cont'd on pg. 29) - The ship pollution statements appear to be the result of a misunderstanding. Although the risk of pollution during the winter is obviously greater with navigation as opposed to without navigation, the risk as compared to summer operations should be less because of lower traffic levels, lower vessel speeds, and resistance from ice to movement outside the ship channels in confined areas. While both the Coast Guard Draft EIS on domestic icebreaking and the Corps EIS on the program describe a "greater" risk of pollution, this increased risk is described as minimal because of the LAKER fuel tank arrangement and type of damage normally suffered. Further, as noted on pg. 45 of the report, most petroleum products move in Lake Michigan, where ice is not prohibitive.

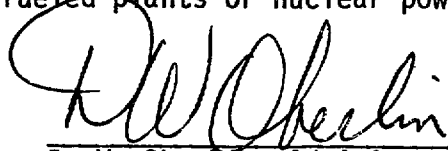
m. Page 33, para. 3 & 4 - As noted above interruptions in ferry service should be a thing of the past in any but the severest winters.

[See GAO note 1, p. 72.]

n. Page 44, para. 3 - Season extension in the St. Lawrence would most likely occur on an incremental basis over the developmental period, so that the first year benefits would be less than the total, but greater than zero.

o. Page 48, para. 1 - As noted above, most ship-building plans for lake carriers are for ice-strengthened, high-powered vessels. Some are already under construction.

p. Page 54, para. 3 - One of the alternatives for season extension on the St. Lawrence addresses the use of thermal power plant cooling water for ice suppression. The source of this thermal effluent could be either conventional, fossil-fueled plants or nuclear power plants.



D. W. Oberlin, Administrator
St. Lawrence Seaway Development
Corporation

Attachment [See GAO note 2.]

- GAO notes:
1. Deleted material suggests changes which have been incorporated in the report.
 2. The attachment is not included in the report.

Note: Page references in this appendix refer to our draft report and may not correspond to the pages of this final report.

PRINCIPAL OFFICIALS RESPONSIBLE
FOR ACTIVITIES DISCUSSED IN THIS REPORT

Tenure of office
From To

DEPARTMENT OF DEFENSE

SECRETARY OF DEFENSE:

Donald H. Rumsfeld	Nov. 1975	Present
James Schlesinger	June 1973	Nov. 1975
William P. Clements, Jr. (acting)	May 1973	June 1973
Elliott L. Richardson	Jan. 1973	Apr. 1973
Melvin Laird	Jan. 1969	Jan. 1973

DEPARTMENT OF THE ARMY

SECRETARY OF THE ARMY:

Martin R. Hoffmann	Aug. 1975	Present
Howard H. Calloway	May 1973	July 1975
Robert F. Froehlke	July 1971	May 1973
Stanley R. Resor	July 1965	June 1971

CHIEF OF ENGINEERS:

Lt. Gen. William C. Gribble, Jr.	Aug. 1973	Present
Lt. Gen. Frederick J. Clarke	Aug. 1969	July 1973

DEPARTMENT OF TRANSPORTATION

SECRETARY OF TRANSPORTATION:

William T. Coleman	Mar. 1975	Present
John W. Barnum (acting)	Feb. 1975	Mar. 1975
Claude S. Brineger	Feb. 1973	Feb. 1975
John A. Volpe	Jan. 1969	Feb. 1973

ADMINISTRATOR, SAINT LAWRENCE SEAWAY
DEVELOPMENT CORPORATION:

David W. Oberlin	Aug. 1969	Present
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COMMANDANT, UNITED STATES COAST GUARD:

Adm. Owen W. Siler	May 1974	Present
Adm. Chester R. Bender	June 1974	May 1974

DEPARTMENT OF COMMERCE

SECRETARY OF COMMERCE:

Elliott L. Richardson	Feb. 1976	Present
Rogers C. B. Morton	May 1975	Jan. 1976
John K. Tabor (acting)	Mar. 1975	May 1975

DEPARTMENT OF COMMERCE (continued)

	<u>Tenure of office</u>	
	<u>From</u>	<u>To</u>
Fredrick B. Dent	Feb. 1973	May 1975
Peter G. Peterson	Feb. 1972	Jan. 1973
Maurice H. Stans	Jan. 1969	Feb. 1972
ADMINISTRATOR, MARITIME ADMINISTRATION:		
Robert J. Blackwell	July 1972	Present
Andrew E. Gibson	Mar. 1969	July 1972

ENVIRONMENTAL PROTECTION AGENCY

ADMINISTRATOR:		
Russell E. Train	Sept. 1973	Present
John R. Quarles, Jr. (acting)	Aug. 1973	Sept. 1973
Robert W. Fri (acting)	Apr. 1973	Aug. 1973
William D. Ruckelshaus	Dec. 1970	Apr. 1973

WINTER NAVIGATION BOARD

CHAIRMAN (note a):		
Brig. Gen. Robert Moore	July 1975	Present
Brig. Gen. Walter O. Bachus	Dec. 1973	July 1975
Major Gen. Ernest Graves	July 1971	Dec. 1973

^aAlso the Corps' North Central Division Engineer.





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