FORE RIVER/PORTLAND HARBOR, MAINE
NAVIGATION IMPROVEMENT STUDY

ECONOMICS REPORT

December, 1984

Prepared by The

New England Division, Corps of Engineers

Department of the Army

ECONOMICS REPORT

TABLE OF CONTENTS

ECONOMICS REPORT

List of Figures

GLOSSARY OF ABBREVIATIONS

MLW	- Mean low water
MDOT	- Maine Department of Transportation
MOER	- Maine Office of Energy Resources
NEC	- Not Elsewhere Classified
SMSA	- Standard Metropolitan Statistical Area
ST	- Short tons equivalent to 2000 pounds

Economics Report

Previous Studies

This present appendix is the latest economic analysis for the on-going study for navigation improvements of the Fore River Channel in Portland Harbor in accordance with the U.S. Senate Resolution dated February 19, 1968. A previous release of information in July 1977 on the study[1] and summarized in Table 1 considered eight alternatives for meeting the future needs of navigation. These alternatives comprised various combinations for modifying or replacing the existing Portland Bridge whose opening presents a constraint to navigation, the deepening of the Fore River Channel and a common petroleum receiving terminal for the oil companies. The economic evaluation of all of these feasible alternatives yielded only No 8 as having a benefit-cost ratio in excess of one and only barely so. Alternative 8 is a common terminal facility consisting of a pipeline, intermediate storage and distribution system located outside of the Fore River Channel obviating the need for large vessels to traverse the Federal Channel or transit the Portland Bridge. Under existing authority, the Corps of Engineers can not participate financially in or construct such a facility. The common terminal facility solution was found to be unacceptable to the major users and interested oil parties in Portland Harbor.

In September 1983, the final report for the Feasibility Study-Fore River Crossing, Portland - South Portland was completed for the Maine Department of Transportation.[2] The study built on the work achieved in earlier studies with the intent of determining the feasibility and practicality of constructing a replacement structure for the bridge or repairing it and of identifying the probable impacts upon the social, economic and physical environment. The consultants used the 1979 Benefit-Cost Study [3] as a basis of identifying and quantifying benefits, among which were those to waterborne transportation. These made up nearly three-fourths of total benefits and were therefore largely responsible for justifying the $58 to $83 million capital investment. The capital investment varies according to the level of upgrading. The benefit-cost ratios for the 1983 study vary between 2.52 and 3.01. The waterborne commerce benefits consist of three items of cost savings as a result of widening of the navigation opening from 98 to 200 feet between protective fenders.

- net shipping cost savings due to the efficiencies of scale from the increased use of larger vessels, these savings comprise more than 95% of waterborne commerce benefits.

- net reduction in operating cost due to less vessel trips,

- reduction in waterborne accidents.

Table No. 1
Portland Harbor

ALTERNATIVES FOR MEETING FUTURE NAVIGATION NEEDS - 1977

	Summary Description of Alternatives	Benefit/Cost Ratio
1.	The do-nothing or without project alternative	
2.	Replacement of existing bascule opening on Portland Bridge by a 200 foot wide vertical lift span. Channel and turning basin to remain at 35 feet.	0.34
3.	Same as alternative No. 2 except that the depth of Channel and turning basin would be increased to 40 feet.	0.72
4.	Replacement of existing bridge with a high level bridge Channel depth and turning basin to remain at 35 feet. Navigation opening 200 feet wide.	0.37
5.	Same as alternative No. 4 except that Channel depth and turning basin to be increased to 40 feet.	0.72
6.	Replacement of existing bridge with a low span vertical lift bridge. Navigation opening 200 feet. Channel and turning basin to remain at 35 feet deep.	0.49
7.	Same as alternative No. 6 except that channel and turning basin depth would be increased to 40 feet.	0.92
8.	A common petroleum receiving terminal, intermediate storage facility and pipeline distribution system located north of Portland Pipeline Pier #2 in South Portland. No channel deepening required. No need for large vessels to pass through the bridge.	1.06

Source: Corps of Engineers, New England Division, Water Resources Improvement Study for Navigation in the Fore River, Portland, Maine - July, 1977

The waterborne commerce benefits assume,

- the maintaining of the 35 foot deep Fore River Channel,

- beginning with 5,087,000 ST in 1985, a 1.5% annual growth rate in petroleum products (other than crude) transported through Portland Harbor to the year 2000 and 1% thereafter to 9,000,000 ST in 2035,

- a change in vessel mix from an estimated 62% tankers and 38% barges during the 1976 to 1978 period to 77% and 23% respectively during the 1985-2035 period of the study.

- a change in the number of tankers in the vessel mix plying between the Gulf of Mexico and the Caribbean areas and Portland Harbor from 24% during the 1976-78 period to 39% during the period of the anaylsis.

Refined petroleum products in this present report are projected to increase to 10,000,000 ST in 2035.

Methodology

In principle, the economic justification of the proposed improvements of navigation projects is to be determined by comparing the average annual benefits accruing to the project over its economic lifespan to the equivalent average annual costs. In general, the benefits should equal or exceed the costs for the Federal Government to participate in the project but non-quantifiable environmental qualilty considerations may also lead a plan to be recommended.

Benefits and costs are to be compared by putting them on an average annual basis using the interest and amortization rate of 8 5/8% currently applicable to Federal projects. The economic life of the project is considered to be 50 years.

Costs

First costs have been estimated for the channel deepening alternatives. Two channel widths were considered, 400 feet and 500 feet, which follow the same alignment as the existing channel. Three depths were considered for each channel width, 38 feet, 41 feet and 45 feet. In addition, costs were estimated for constructing a maneuvering area that would provide access to shipping activities along the Portland side in the area of the State Pier. Dredging quantities would range from about 1,031, 300 cubic yards to 5,015,500 cubic yards, depending upon the alternative. First costs include contingencies, engineering and design and supervision and administration. First costs for the various channel deepening alternatives are summarized in Table 2 below.

Eventually annual costs based on a 50 year project life and an interest rate of 8 5/8% would be calculated. In addition to annual first costs, annual costs would include interest during construction and maintenance.

Table 2
FORE RIVER/PORTLAND HARBOR, MAINE - NAVIGATION IMPROVEMENT STUDY
FIRST COST AND CONSTRUCTION TIME FOR CHANNEL DEEPENING ALTERNATIVES
(1984 Price Level)

	400 Foot Channel			500 Foot Channel		
Channel depth (feet)	38	41	45	38	41	45
Construction Time (mo.)	9	16	26	14	23	33
First Costs ($1000)	5,901	10,727	15,954	9,647	14,364	20,865

	400 Foot Channel & Maneuvering Area			500 Foot Channel & Maneuvering Area		
Channel depth (feet)	38	41	45	38	41	45
Construction Time (mo.)	10	20	33	16	26	39
First Costs ($1000)	7,218	12,941	20,770	10,819	16,898	25,116

Benefits

Theoretically the economic benefits from the deepening of the Fore River Channel in Portland Harbor are the reduction in the value of resources required to transport commodities and an increase in the value of output of goods and services. The major potential economic benefits for this present study have been identified as those due to the use of larger vessels for the transportation of refined petroleum product which comprises more than 96% of all traffic in the Fore River Channel. These could arise through the use of larger tankers to obtain efficiencies of scale and reduced transportation costs. For companies engaged in the repair and overhaul of deep draft vessels, the national benefits, if any, would accrue to their clients, through savings from the use of Portland Harbor facilities as compared to the use of facilities elesewhere. More efficient use of existing vessels would also occur due to reductions in tidal delays and the necessity for multiport operations. Improved safety at the harbor, though not directly quantifiable, would also be a significant benefit. The risk of collisions and/or groundings is partially dependent on the density of traffic. Deepening the channel would enable larger vessels to make fewer total trips, thus decreasing traffic and improving safety.

Benefits have not been computed in the body of this report. However, the analysis of existing data and information and the declarations of oil terminal users indicate a slow growth market for petroleum products in the Portland area and a trend toward the use of more and larger barges for the transportation of petroleum product, other than crude. Barges, which now constitute approximately 50% of all tankers with drafts in excess of 18 feet transiting the Fore River Channel, would not require a deepened harbor. There is a great deal of uncertainty in the oil market today. On the one hand, independent petroleum marketers have been increasingly replacing larger producer/refiner companies in the Portland area. The independent marketers lease space and or have throughput agreements with the oil terminal operators. With respect to the purchase of petroleum, they may operate on contracted agreements as well as on the spot market in the Boston and New York-New Jersey areas. Given the current glut in the oil market, they prefer to keep inventories low, buy on the nearby spot markets, and transport their product by barge. On the other hand, although some oil terminal operators see the trend towards the increased use of barges continuing, lower overseas refining costs may reflect increased temporary use of tankers.

General and dry bulk traffic, estimated at approximately 200,000 tons in 1984, is relatively insignificant.

For certain terminals, the deepening of the Fore River Channel would undoubtedly lessen transportation costs due to reduced tidal delays and multiport operations. In addition, cost savings may likely accrue to deeper draft vessels using the Bath Iron Works repair facility as a result of the deepening of the Channel. Again these benefits have not been quantified in this appendix since they are relatively insignificant and would not of themselves justify navigational improvements.

Economic Study Area

Situation. Portland Harbor located on the southwest end of Casco Bay in Maine, is about 100 miles northeast of Boston, Massachusetts. It is the second largest commercial harbor in New England and the largest in the State of Maine. The harbor is formed by a group of outlying islands and a mainland peninsula divided by the Fore River which makes a natural barrier separating the city of Portland on the north from the city of South Portland on the south.

Tributary Area. The immediate tributary area consists of the cities of Portland and South Portland both of which border the harbor. Greater Portland comprises thirteen cities and towns including Portland and South Portland. The Portland Standard Metropolitan Statistical Area (SMSA) additionally comprises Saco and Old Orchard Beach for a total of 15 cities and towns, while Cumberland County consists of twenty-five cities and towns. Portland Harbor is the receiving port for southern Maine, the adjacent area of New Hampshire and the Province of Quebec, Canada for crude oil. A pipeline system carries crude oil from Portland Harbor to refineries in Montreal and another smaller one transports petroleum products to Bangor.

Transportation. There is an excellent system of interstate and local highways and roads serving the Portland Harbor area. These are notably the Maine Turnpike (U.S. 95), a link in the National Interstate Highway System, Route 1, a part of the northeastern United States Coastal route, Route 295 an arterial route through Portland city and Route 77 which carries the Portland Bridge across the Fore River Channel. The latter is the major transportation link between the city of Portland and the city of South Portland and other cities and towns to the south and the southeast.

The acquisition of the Maine Central, Boston and Maine, and the Delaware and Hudson Railroads by Guilford Transportation Industries provides a combined system link between Portland and the American and Canadian west through Buffalo and Montreal, and also with Calais, Maine and with New York and Washington, D.C.

The Portland International Airport serving passenger and freight traffic lies contiguous to and west of the Fore River navigation channel.

Ocean navigation extends from a 45 foot entrance channel from Casco Bay, a 35 foot deep channel in the Fore River through the Portland Bridge as far as the approach to the Veterans Bridge, a 30 foot deep approach to Back Cove and several shallower channels. The Portland Bridge, located across the channel, has a navigation opening for vessel passage. This consists of two bascule leaves which are raised to create a maximum horizontal clearance of 98 feet. This clearance restricts the size of vessels which can navigate the upper portion of the Fore River Channel and has been a major constraint to navigation on the upper portion of the channel serving many of the major oil terminals.

Population.[4] The cities of Portland and South Portland with 1980 populations respectively of 61,572 and 22,712 inhabitants experienced losses in population of 5.4% and 2.4% during the 1970-80 period. The greater Portland area registered a population growth rate for the same period of approximately two-thirds of the national average of 11.15% and Cumberland County just higher than the national average. However, in Portland, there was a 51% increase in people between the ages of 20 to 34. In that decade, single person households grew 40%; families below the poverty level dropped 12%. Portland city seems to be experiencing changes in demographic patterns which are typical of national trends: the out-migration primarily of families with children from the core cities to suburban and exurban areas; the in-migration of young and professional workers for employment, but also to meet quality of life goals.[5] The Portland SMSA has continued to register unemployment rates 3 to 4 percent below the national average, due largely to the highly diversified nature of its economy.

Development The cities of Portland and South Portland comprise the major center of social, cultural, educational, financial, commercial and economic activity in the state of Maine. The city of Portland is a highly diversified manufacturing city which has recently witnessed an influx of financial institutions, insurance companies and small high tech establishments. All of the oil terminals and tank farms in the Portland area are located in South Portland.

Henry Wadsworth Longfellow said of his hometown: "Often I think of the beautiful town that is seated by the sea." Portland is a pleasant place to live and vacation. It has clean, fresh sea air and the convenience of an urban environment without the degree of inconvenience of larger cities in traffic congestion, pollution, crowded living conditions, etc. Portland's cultural (museums, galleries, theatres, etc.) and recreational (marine activities, restaurants, etc.) activities are of excellent quality. Tourism is a major and growing industry in the Portland area. The city of Portland is undergoing a program to restore many of its distinguished buildings from every era of its development and to revitalize its downtown.[4]

Historically, Portland has been the major port on the U.S. seaboard north of Boston for commercial, fishing, railway, petroleum, shipbuilding and related activities. Portland witnessed several recurring themes in its development history.

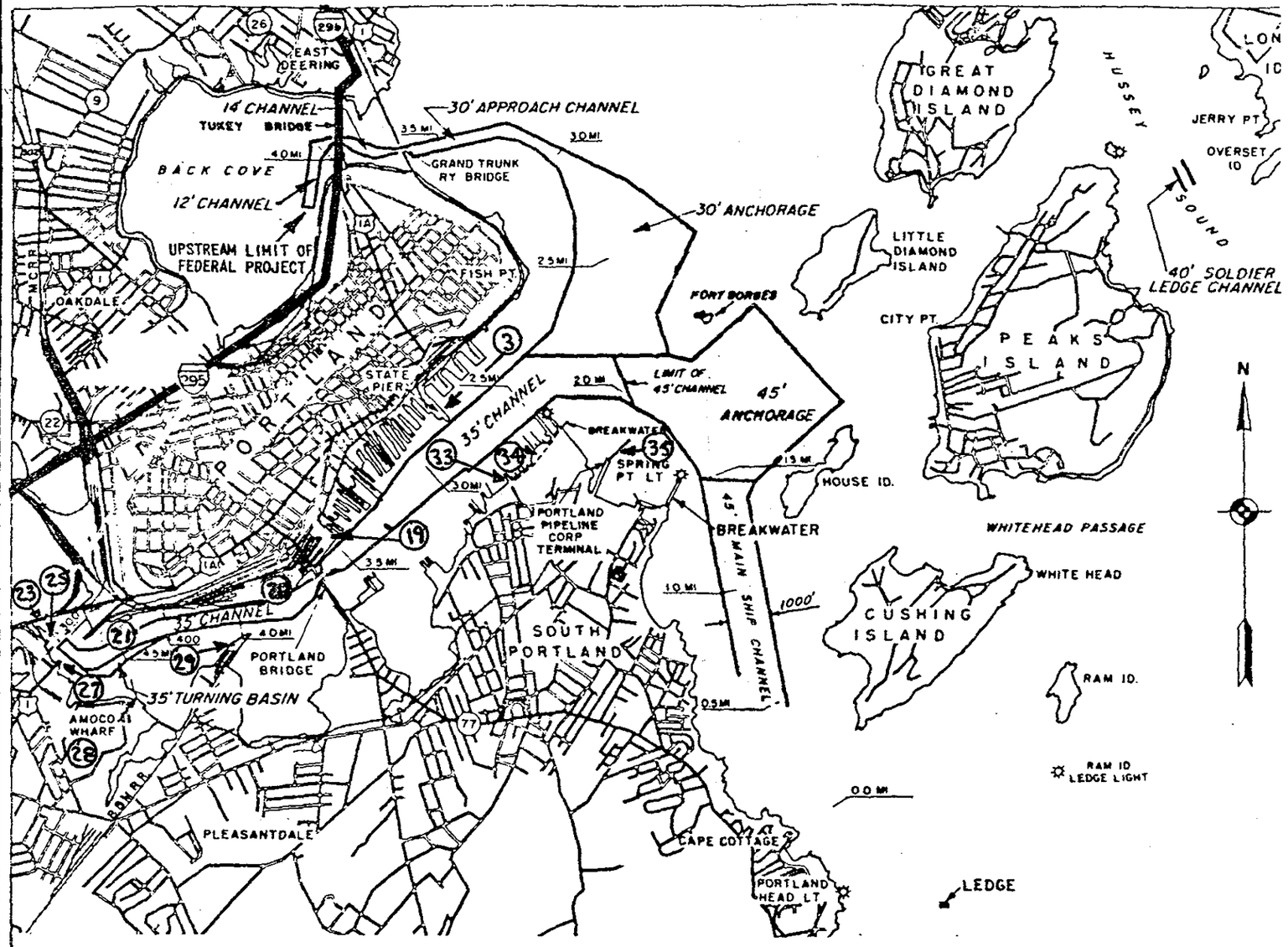
The consolidation of the Maine Central, the Boston and Maine, and the Delaware and Hudson Railroads through their acquisition by the Guilford Transportation Industries in 1984 has formed a combined rail system from Calais, Maine to Buffalo, New York and from Montreal to Washington, D.C. Transporters and port terminal operators are now actively trying to exploit these advantages for fully realizing the dream of the mid-19th century entrepreneurs to establish Portland as a major commercial port for a land bridge to the American west through Buffalo and the Great Lakes and a year-round all weather port for Montreal and Western Canada. The freezing of the St. Lawrence River in winter limits access to Montreal and Western Canada during this period. The completion in 1984 of construction of the Portland Fish Pier at an estimated $20 million is aimed at capturing some of the value added from Portland fisheries which now accrues to fish dealers in out-of-state markets. Facilities include vessel services, icing, auction facilities processing, retail shops and a restaurant. The Bath Iron Works expansion into Portland Harbor for the overhauling and repair of oceangoing vessels recalls shipbuilding in Portland Harbor which reached its peak during the mid-19th century.

Terminal and Transfer Facililties [6/]

Fifty-four piers, wharves and docks are located in the port of Portland. Starting from the north in the city of Portland, two are located at the East Deering entrance to Back Cove and twenty-nine, including the principal general cargo handling piers, are situated on the north side of Fore River. Twenty-three, including all of the oil facilities are located in South Portland: twenty on the south side of the Fore River Channel and three on Casco Bay just south of the river mouth.

Up to now, the primary use of the Portland Harbor facilities has been for receiving and transshipping of petroleum products which represent more than 98% of all commodities handled by the port. All oil terminal facilities are located along the South Portland waterfront. Relatively small volumes of general cargo such as pulp, paper products, fish and forest products and bulk cargo including coal, urea and salt are shipped through facilities in Portland Harbor. State, local and private interests are actively promoting general cargo movements through the port including break-bulk, bulk and container cargo.

Bath Iron Works commenced operations at the former Maine State Pier in Portland in December, 1983 for the repair of naval and commercial vessels. In addition, four other piers are used for the repairing and drydocking of small vessels. Portland Harbor also services a sizable passenger service between Nova Scotia and the inhabited islands in Casco Bay. The recently completed Portland Fish Pier includes vessel services,



CITY OF PORTLAND
3 Bath Iron Works Wharf
19 Portland International Ferry Wharf
20 Portland Terminal Co.(Guilford Express) Wharf
21 Merrill's Marine Terminal

CITY OF SOUTH PORTLAND
23 Bancroft & Martin L Dock Serving:
Exxon, Getty & Koch, Gulf
25 Bancroft & Martin T Dock Serving:
British Petroleum

CITY OF SOUTH PORTLAND
27 Mobil Oil Co. Dock
28 Amoco Oil Co. Wharf
29 Texaco Wharf
33 Portland Pipe Line Co.-Pier 1
34 Chevron Oil Co. Dock
35 Portland Pipe Line Co.-Pier 2

NOTE: Encircled location numbers from U.S. Army Corps of Engineers. Port Series No. 1 - 1976. These are P.W.D. reference numbers.

Figure 1

Port Facilities Discussed in Study

WATER RESOURCES IMPROVEMENT STUDY
FORE RIVER
PORTLAND HARBOR, MAINE

1984

IN 1 SHEET SCALE IN FEET
1000 0 1000 2000 3000 4000

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

icing, and auction and processsing facilities. The fishing fleet using the harbor facilities in 1980 was estimated to be 500 vessels.[7] Other uses of the harbor facilities are marinas, a yacht club, a municipal boat launch, restaurants and other recreational uses.

The decline in oil and oil products demand in the area served by Portland Harbor and consequent decrease in oil shipments to Portland could lead to a consolidation of oil terminals through mergers and acquisitions, the shifting of some of the remaining terminals to more attractive sites and a change in land use for the abandoned facilities to recreational, residental and commercial use. Since this report is interested in deep draft vessel traffic, only those piers so concerned will be treated here.

Figure 1 presents the port facilities whose use could affect the decision to deepen Portland Harbor to more than 35 feet. The encircled number on the map are the Piers, Wharves and Docks (PWD) reference numbers from the U.S. Corps of Engineers Port Series No. 1 (1976).

On entering harbor, the first oil terminal in South Portland is the Portland Pipe Line Corporation (PPLC) facility which has two piers. Pier #2, having a depth of 48 feet below MLW, is located in the main ship/anchorage channel and pier #1 with a 34 foot depth just inside of the Fore River Channel in South Portland. Tank storage capacity is 3,329,133 barrels. Pier #1 is used as a reserve facility which has not been operating for several years. Pier #2 receives the only crude oil brought into Portland Harbor. The crude is transported by pipeline owned jointly with the Montreal Pipe Line Company to refineries in Montreal.

The frequency of oil tanker traffic into PPLC's facilities has dropped dramatically from 446 vessels in 1974 to 57 vessels in 1983. The capacity of the average vessel has, however, increased from 64,300 DWT and 36.7 foot draft to 89,000 DWT and 37.4 foot draft. Given its location outside of the Fore River Channel, its ability to service tankers of 45 foot draft and that it is presently operative at only about 15% of its 1974 capacity, PPLC will not benefit from a deepening of the Federal Channel.

The Chevron Oil Company Dock is located on the Fore River Channel approximately 800 feet downstream from the PPLC Pier No. 1 in South Portland. Dredging was done at the Chevron berth several years ago. Because of the ledge encountered, all ships are restricted to 28 feet forward and 33 feet aft. Storage capacity is approximately 750,000 barrels. Chevron is in the process of acquiring Gulf and has throughput agreements with Northeast Petroleum Co. and Citgo. The Chevron terminal receives kerosene, distillate and residual fuel oil, gasoline and jet fuel. In 1982 and 1983, the aggregate volumes of these products including throughput for other clients were approximately 5,318,475 and 4,658,657 barrels respectively.

Virtually all of Chevron's petroleum product moves into Portland Harbor by leased barges. Practically all tanker traffic into the Chevron terminal is brought in by Northeast Petroleum Company for residual fuel oil.

Both Chevron and Northeast see an increased use of barges for the transport of their petroleum product. Tankers will, however, continue to be used for Northeast's residual fuel oil.

The Texaco Wharf located approximately 0.4 miles upstream from the Portland Bridge in South Portland has the deepest berth depth (42 feet below MLW) of all cargo handling terminals on the Fore River Channel. Texaco has the only wharf on the Fore River Channel whose berth is deeper than the present Channel depth of 35 feet. Storage capacity is approximately 640,000 barrels. Texaco has throughput agreements with Northeast Petroleum and Global Petroleum. The Texaco terminal receives kerosene, distillate and residual fuel oil and gasoline. Total volume in 1983 was approximately 3.4 million barrels half of which was residual fuel. Texaco's petroleum product is shipped by company owned barges to the terminal. In general, only tankers for Northeast and Global carrying residual fuel oil are serviced at the Texaco terminal.

Traffic received at the Texaco terminal has declined dramatically in the past several years due primarily to conversion from oil to other energy use. Paper mills notably have converted to wood byproducts for their energy needs. Traffic declined from 42 tankers and 123 barges in 1977 to 2 tankers and 40 barges in 1983. Beginning in 1984, Texaco has received for its own use a higher proportion of tankers than recent previous years. Although spokespersons at Texaco see the long term trend towards an increased use of barges, lower overseas refining costs may reflect increased temporary use of tankers. Texaco would not, however, construct larger tankers. According to Texaco, Northeast and Global officials, the trend to the construction and use of larger barges will continue.

The Amoco Oil Co. Wharf located approximately one mile upstream from the Portland Bridge on the Fore River Channel in South Portland has a depth at its berth of 27 to 30 feet below MLW and a storage capacity of approximately 500,000 barrels. Amoco has withdrawn its services from the area and its property is to be sold. Another oil terminal operator could move to the site or the site could be open to a different functional use.

The Mobil Oil Company Dock, located approximately 1.5 miles upstream from the Portland Bridge on the Fore River Channel in South Portland, has a depth of berth below MLW of 35 feet and a storage capacity of approximately 875,000 barrels. Mobil has agreements for servicing petroleum product shipments for Northeast Petroleum and British Petroleum (B.P.). The terminal receives approximately 14 million barrels each year

composed of kerosene, distillate fuel, gasoline, jet fuel and other petroleum products. About one half is destined for Mobil and the other half for Northeast and B.P.

Current annual traffic to the terminal consists of 30 to 40 barges and 20 U.S. Registry tankers (mainly 32,000 DWT) destined for Mobil, 20 tankers (mainly foreign) of the 30,000 to 37,000 DWT class for Northeast and mainly barges for B.P.

British Petroleum (B.P.) has handled between 5.1 and 6.6 million barrels of product composed of gasoline (70%), kerosene (5%) and #2 fuel (25%) per year during the 1981 to 1983 period. About 95% of all receipts are shipped by coastal barge. Occasionally, B.P. receives a 30,000-35,000 DWT tanker with a maximum draft of 32 feet. The deepening of the Fore River Channel would have no effect on Mobil's and B.P.'s operations in Portland Harbor. Deeper draft tankers would not be used.

The Bancroft and Martin T Dock, located approximately 1.6 miles upstream from the Portland Bridge on the Fore River Channel in South Portland, has a depth of berth below MLW of approximately 23 feet. B.P. is the sole user of the dock. B.P. receives some of its petroleum product at the deeper berth Mobil dock. The T and L docks are owned by Bancroft and Martin, a steel fabricating company. The oil companies lease the property and own their own facilities. Because of depth of berth limitations, only relatively shallow draft barges are received at the T dock.

The Bancroft and Martin L Dock, the furthest upstream dock on the South Portland shoreline, is located on the downstream side of the Veterans Memorial Bridge. The depth at the berth is 34 feet below MLW. The dock serves Exxon, Getty, Koch and Gulf. Getty has recently been acquired by Texaco and will probably have to divest itself of some of its northeastern operations in order to comply with anti-monopoly regulations. Gulf has been acquired by Chevron but will continue to operate separately at least up to December 1984. Gulf received approximately 2,500,000 barrels consisting of kerosene, distillate fuel, gasoline and jet fuel per year for the 1982 and 1983 periods. It has a storage capacity of approximately 490,000 barrels. Until recently, Gulf used some ocean going vessels for the transport of its product but now the trend is towards more and larger barges. B.P. is under contract to perform certain petroleum related operations for Gulf.

Exxon has a storage capacity of approximately 760,000 barrels for the receipt of gasoline, diesel and distillate heating oil. All of Exxon's petroleum product is transported into Portland by two company owned barges. Spokespersons at Exxon anticipate that future traffic will continue to be dominated by barges. Accordingly, the widening of the navigation opening of the Portland Bridge would encourage the user of larger barges and not tankers.

Koch Fuels Incorporated, which receives kerosene, distillate fuel, gasoline and asphalt at its terminal, has a storage capacity of approximately 550,000 barrels. Koch receives about 1.2 million barrels per year. Eighty percent of the fleet transporting petroleum product to the Koch terminal consist of 25 to 26 foot draft barges. Twenty percent are tankers. No tanker servicing the Koch terminal has experienced tidal delays in recent years. According to officials, the trend towards the incrased use of barges for the transport of petroleum products into Portland Harbor will continue.

Two independent petroleum marketers operate in South Portland: Northeast Petroleum Corporation and Global Petroleum Corporation. They rent space at certain terminals and have throughput agreements with others. Northeast leases 180,000 barrels of storage at the Global terminal and 250,000 barrels at Chevron and has throughput agreements with Chevron and Texaco. Because of depth limitations at Chevron, most of Northeast's deeper draft (MAX.35000 DWT and 35 foot draft) traffic, estimated at 20 per year for residual oil is received at the Mobil Terminal. Although Northeast may experience some tidal delays for the servicing of its deeper draft vessels, it would not use deeper draft tankers if the Fore River Channel were deepened since the Portland area is not an expanding energy market and because Northeast has a long term barge contract.

Global leases expanding space of the Texaco berth. Spokespersons at Global forecast a maximum of 37 to 38 foot draft vessels in the future which could traverse the Channel at high tide. A deepening of the Federal Channel would permit Global to reduce tidal delays but would not result in deeper draft vessels given the slackness of the present oil market situation.

Merrill's Marine Terminal is located at the downstream side of the Veterans Bridge on the north side of the Fore River Channel in the city of Portland. The terminal consisting a 900 feet long pier with a 35 foot below MLW berth, 80,000 square feet of marginal wharf, 750,000 cubic feet of covered storage and 6 acres of accumulated yards is designed to handle approximately 1,000,000 tons of mixed cargo per year. Operations began in 1982. Traffic in 1984 reached approximately 200,000 tons. About three-quarters was dry bulk and one-quarter general cargo.

Although Merrill has over 50 years of experience in transportation and industrial development, the Marine Terminal is a new operation. Merrill expects to service about 1,000,000 tons by the early 1990's. Product mix is difficult to predict but the following possibilities are

- The establishment of a land bridge between Portland and the Great Lakes through Buffalo primarily for the transport of grain. The recent acquisition of the Maine Central Railroad, the Boston and Maine Railroad, and the Delaware and Hudson Railway Company by the Guilford Transportation Industries makes possible single rate shipments on a

commonly owned track between Portland and Buffalo on Lake Erie. However, Maine ports will have a competitive advantage only for cargoes which can move overland to a Maine port more cheaply than to a competitive port since ocean freight rates to foreign ports are about the same for all major U.S. North American ports and since terminal handling costs are usually a small part of total transport costs.[8/] Since the truck and rail rates have been demonstrated to be approximately proportioned to distance, Portland will have a competitive advantage only for those origins and destinations of bulk commodities closer to Portland than to other ports. Other north and middle Atlantic ports area closer to Buffalo than is Portland.

- Merrill is actively promoting the export and import of forest and paper products through Portland. Efforts are being made to obtain a larger share of the export trade for wood and wood products originating in the State of Maine. From 1977 to 1981, Portland Harbor exported between 6,000 and 38,000 short tons per year of these products and received a maximum of 4,000 of the same. Searsport exported a maximum of 32,000 tons per year for the same period and imported none.

- Merrill had expected that coal imports through Portland could reach 500,000 tons by the early 1990's. However, the present oil glut and consequent decline in oil prices and the demonstrated feasibility of paper mills to use wood by-product for steam and electrical production has caused a decline in interest in the conversion to coal as an energy source.

- Merrill expects to expand its operations for the transport of salt and urea imports through Portland and for the export of scrap metal.

If the Fore River Channel were deepened to more than 35 feet below MLW and market conditions favorable, Merrill has indicated that it is highly probable that a floating crane would be breasted alongside of the existing pier and some dredging undertaken in order to service vessels with drafts in excess of 35 feet.

The Portland Terminal Co. (Guilford Express) Wharf and the Portland International Ferry Wharf with berth depths respectively of 30 to 35 feet below MLW are presently being considered by the Maine Department of Transportation (MDOT) as a site for a public pier for bulk cargo facility and a container feeder service to Halifax, Nova Scotia. The MDOT has been trying to locate a container facility in Portland for some time. The bulk handling facilities would essentially target the same market described above for Merrill's Marine Terminal. Portland does not appear to have a competitive advantage over other north and middle Atlantic ports for the shipment of bulk commodities from the Great Lakes. With respect to containerized cargoes, the establishment of a feeder container service as recommended [8/] at the Portland Terminal Properties, currently for sale by Guilford Industries, would not require a depth below MLW of more than 35 feet.

The Bath Iron Works (BIW) Wharf is located at the site of the former Maine State Pier in the City of Portland. The two docking piers have berth depths of 35 feet below MLW. The dry dock is capable of accommodating ships of 1,000 feet in length and up to 140 feet in width. The draft above its 5 foot keel blocks is 40 feet. BIW began its operations in Portland in December 1983 primarily as an overhaul and repair facility for U.S. naval and commercial ships. All of BIW's work is expected to be the result of competitive bids. BIW will have to use the advantages of its large capacity facilities, its reputation, quality workmanship and possibly lower costs to overcome its remoteness from the main domestic trade route between the Gulf of Mexico and the Atlantic coastal ports as far north as Boston. According to BIW, the cost of bringing a vessel from Boston to Portland, for example, is about $20,000 per day.

At present, deeper draft vessels must take advantage of the tides and/or be deballasted before entering the harbor. The deepening of the harbor would permit BIW to move efficiently service vessels with drafts in excess of 35 feet and possibly bid for work on larger ships. However, given the infancy of BIW's operations and the consequent lack of a record of accomplishments in Portland Harbor, it is too soon to predict whether BIW would benefit significantly from a deepening of the Federal Channel.

Commerce (Past and Projected)

Historical Commodity Movements - In New England, Portland Harbor is second only to the Port of Boston in the movement of commodity traffic. In recent years, passenger traffic primarily to the harbor islands and international service to Nova Scotia has varied between 500,000 and 600,000 passengers per year. Of the fifty-four piers, wharves and docks, twenty-nine are located on the Portland or north side of the Fore River, two north of Portland at the entrance to Back Cove, and twenty on the south side of Fore River and three on Casco Bay in the city of South Portland. All of the major receiving docks for petroleum product are located on the Fore River in South Portland. The companies operating here are: British Petroleum, Chevron, Exxon, Global, Gulf, Koch, Mobil, Northeastern Petroleum, Portland Pipe Line Corporation (PPLC) and Texaco. Distribution of petroleum is made by vessels, barges, railroad tank cars, truck and pipeline.

More than 96 percent of all commodity traffic through the harbor is petroleum and petroleum products of which approximately three quarters constitutes imports from foreign countries. See Tables 3 and 4.

Total traffic through Portland Harbor has grown from 15,509,000 short tons (ST) in 1961 to a peak of 31,679,000 ST in 1971 and then declined to 10,456,000 ST in 1982. These changes in total commodity movements are attributable primarily to changes in crude oil, all of which is imported from foreign countries and transshipped by pipeline to refineries in Montreal. Imports of crude declined by about 75% from 1971 to 1982. Judging from recent information rerceived from PPLC, the decline has

Table 3
Portland Harbor
Freight Traffic by Commodity - Selected Years
(1000 Short Tons)

	1982	1981	1980	1979	1978	1977	1976	1975	1974	1973	1972	1971	1961
Total Traffic	10456	14753	12848	13262	22165	18326	25374	27566	27606	28844	30683	31679	15509
Foreign Traffic													
Imports	7069	11241	9110	8583	17207	13288	20054	23159	22791	24072	25726	26375	11966
Exports	5	11	41	7	18	31	37	16	17	22	24	10	136
Totals	7074	11252	9151	8590	17225	13319	20091	23175	22808	24094	25750	26385	12102
Domestic Traffic													
Receipts	3039	3009	3209	4071	4156	4218	4506	3633	3744	2739	3925	3950	2998
Shipments	254	364	366	438	615	652	700	584	895	727	686	905	350
Local	89	128	122	163	169	137	77	174	159	284	322	439	59
Totals	3382	3501	3697	4672	4940	5007	5283	4391	4798	3750	4933	5294	3407
Commodities													
Crude Petroleum	5978	9312	6928	5906	16430	12245	19546	22076	21291	22563	24190	24857	11322
Gasoline	1731	1817	1881	1996	2212	2303	2327	2071	2210	2080	2007	2109	1217
Jet Fuel	18	12	35	53	62	63	64	65	65	93	69	33	-----
Kerosene	119	110	130	179	128	223	157	183	201	281	326	341	419
Distillate Fuel Oil	1248	1081	1286	1708	1626	1812	1824	1965	2222	1911	1995	1978	1257
Residual Fuel Oil	837	1520	1394	1666	1554	1566	1317	1102	1401	1748	1923	2203	665
Lubricating Oils and Greases	-----	-----	149	---	-----	1	2	2	3	1	1	1	1
Naptha, Petroleum Solvent	----	2	----	----	----	----			1	1	7	7	3
Asphalt, tar. pitches, cake, solvents, oil and gas products, NEC	68	866[1/]	923[1/]	1559[1/]	107	61	81	39	64	14	97	15	65
Bituminous Coal & Lignite	133	----	----	----	----	----	----	----	----	----	----		269
Others	324	35	269	46	46	53	57	62	150	150	74	135	291

[1/] Primarily crude tar, oil and gas product.

Source: Department of the Army, Corps of Engineers, Waterborne Commerce of the United States

Table 4
Portland Harbor
Freight Traffic - Other Than Petroleum and Coal Products, 1977-198
(1000 Short Tons)

	1982	1981	1980	1979	1978	1977
OUTBOUND						
Exports (Foreign)						
Pulp & Paper Prod.		8	38	6	13	21
Machinery	1	1				
Fabricated Metal Products			1		3	
Lumber			1			
Fresh Fish excpet shellfish					1	1
Fresh & Frozen vegetables						8
NEC	4	2	2	2	1	1
Domestic Shipments						
Fabricated Metal Products		1	1			
Machinery					1	1
NEC				2	6	6
Subtotals	5	12	43	10	25	38
INBOUND						
Imports (Foreign)						
Rubber & Misc. Rubber Prod.		1				
Machinery			2	1		2
Fabricated Metal Products				1	3	
Synthetic Fibers		1				
Forest Products						4
Field Crops			2			
Prepared Animal Feeds			1			
Soap			23			
Gum & Wood Chemicals	300		171			
Fish & Shellfish, Prepared			3	4	4	
NEC	3	1	1	1	1	1
Domestic Receipts						
Fresh Fish except Shellfish	16	20	25	30	12	3
Subtotals	319	23	225	36	20	14
LOCAL			1		1	1
TOTALS	324	35	269	46	46	53

Source: Department of the Army, Corps of Engineers, Waterborne Commerce of the United States

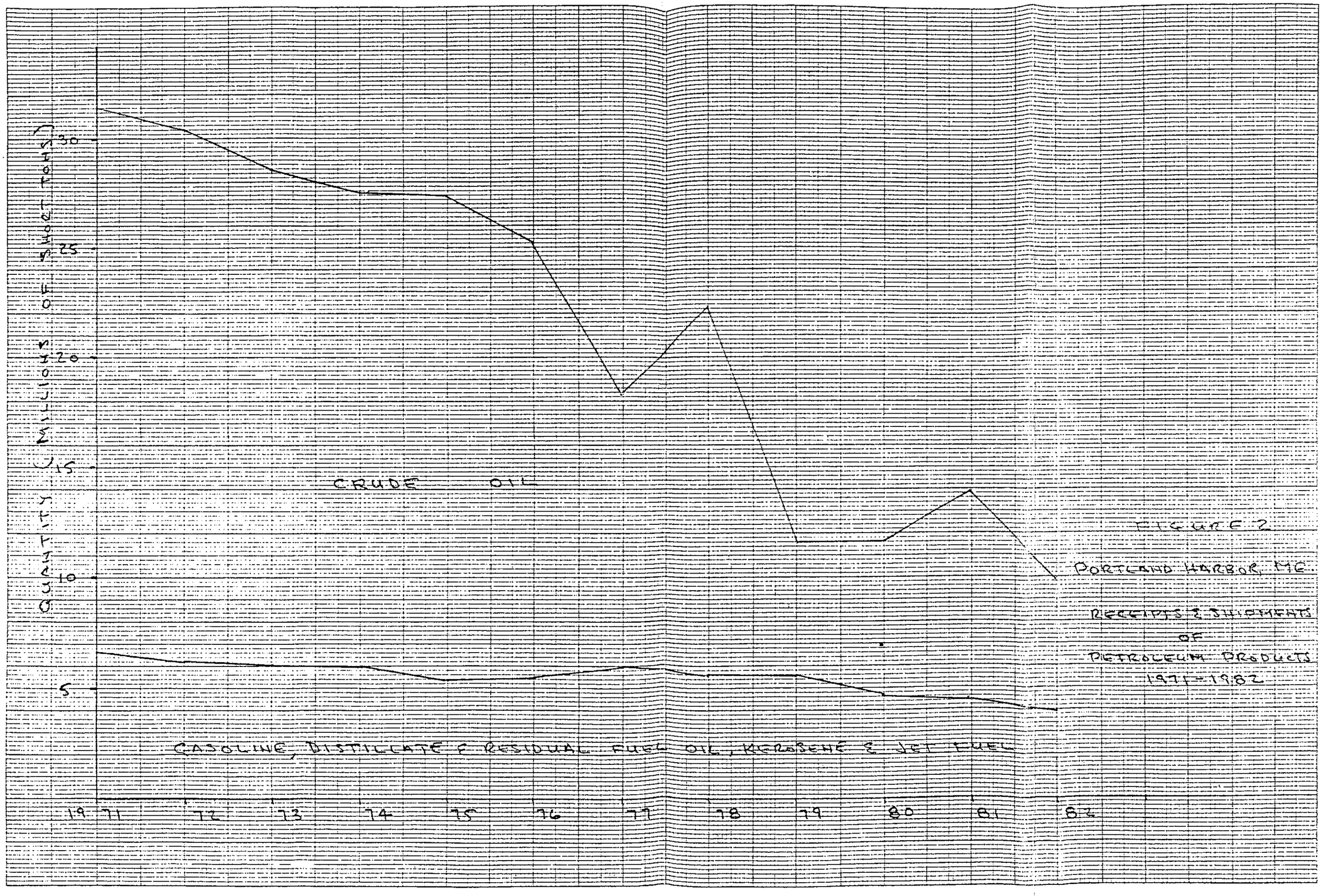


FIGURE 2

PORTLAND HARBOR, ME.

RECEIPTS & SHIPMENTS

OF

PETROLEUM PRODUCTS

1971-1982

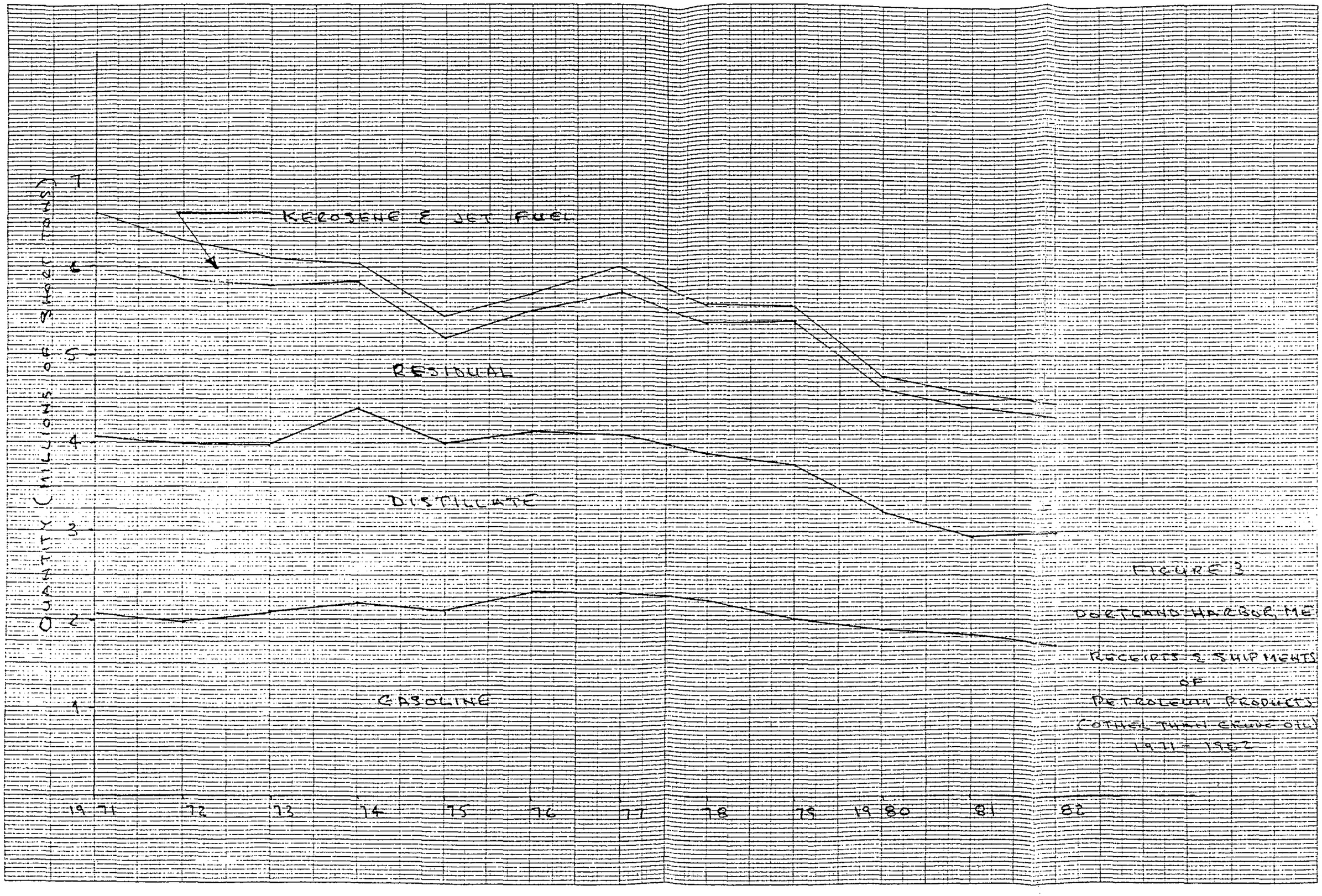


FIGURE 3

PORTLAND HARBOR, ME

RECEIPTS & SHIPMENTS

OF

PETROLEUM PRODUCTS

(OTHER THAN CRUDE OIL)

1971 - 1982

continued through 1983. See Figures 2 and 3. The quantities of other petroleum products (gasoline, residual and distillate fuel, kerosene and jet fuel) have declined by 11% in 1977 and 41% in 1982 as compared to the 1971 level. In general, the declines reflect immediate and lagged softening of demand for petroleum and petroleum products due to price increases, to the oil embargo of the early 1970's and to consequent reductions in inventories.

Analysis and Projection of Trends [10/] - The Portland Pipe Line Corporation (PPLC) imports from foreign sources all of the crude oil entering both the State of Maine and Portland Harbor and transports it by pipeline to the connecting Canadian carrier, the Montreal Pipe Line, which in turn pumps it to refineries in Montreal. All of the crude is offloaded at PPLC's Pier #2 having a depth below MLW of 48 feet and located at the 45 foot anchorage south of the entrance to the Fore River Channel. Pier #2 is therefore located outside of the Fore River Channel, which is the object of this study. Pier #1 with a depth of berth below MLW of 34 feet is used as a reserve pier. The dramatic decline in the quantity of crude shipped to Canada reflects Canadian Government policy to displace large portions of foreign crude imported by Montreal refineries with Canadian oil, gas and hydroelectric sources of energy. Factors which could increase Canadian demand for crude through Portland Harbor are a decision to ship any potential eastern Canadian offshore production through Portland to Montreal, and/or if western Canadian oil reserves are proved to be insufficient or are diverted to United States markets.

Given PPLC's current excess capacity at Piers #1 and #2 and its ability to service deeper draft vessels to 45 feet outside of the Fore River Channel, there is no basis at this time for anticipating that the transport of future Canadian demand for crude oil through Portland Harbor would be able to benefit from the deepening of the Fore River Channel.

Gasoline represents about 40% of all petroleum products, other than crude, received and shipped in Portland Harbor. Except for several temporary declines, the quantities of transported gasoline product has increased from 1,217,000 ST in 1961 to approximately 2,300,000 ST in the 1976-77 period and then declined steadily to 1982, the latest year for which statistics are available. Most people in the Portland Harbor Service area depend on gasoline for commuting and personal travel because of the dispersed rural nature of the state.[16/] The increase in gasoline consumption before the early 1970's oil crisis was due to the growth in motor vehicle registrations and in motor vehicle use. The more recent decline in gasoline consumption likely has been due to price increases triggering the use of more fuel efficient automobiles and a reduction in automobile trips. According to local sources, the decline has probably leveled off in the past year or two due to what has been perceived as a declining trend to smaller more fuel efficient automobiles. The Maine Office of Energy Resources (MOER) forecasts an annual growth rate of approximately 0.2% per year to 1,910,000 ST in the year 2000 for a total increase of 5% in petroleum consumption for the transport sector for the

Table 5
Portland Harbor
Past and Projected Petroleum Products (Other Than Crude Oil) Traffic
(1000 Short Tons (ST)

	1961	1971	1982	Base Year 1985	Year 15 2000	Year 50 2035
Petroleum Products						
Gasoline	1217	2109	1731	1832	1910	2700
Residual Fuel Oil	665	2203	837	1582	1840	2600
Distillate Fuel Oil	1257	1978	1248	1163	1475	2200
Kerosene & Jet Fuel	419	374	137	150	255	500
Other Petroleum Products and Coal & Gas Products	338[1/]	23	68	950	1265	2000
Totals	3896	6687	4021	5677	6745	10000

[1/] includes 269,000 ST of bituminous coal lignite.

Sources:
- Past Traffic - Corps of Engineers, Waterborne Commerce of the United States
- Projected Traffic - Corps of Engineers, New England Division Planning (IAB/ERAS)

State of Maine. Retaining this assumption and then projecting demand at 1% from the year 2001 to 2035, the demand for gasoline would be approximately 2,700,000 ST or about 16% higher than the 1976 peak. Using, therefore, even rather optimistic assumptions concerning future demand for gasoline in the area served by Portland Harbor, future needs will not exceed the 1977 demand well into the 21st century. See Table 5.

Residual fuel oil has in recent years has constituted between 18% and 33% of all petroleum products, other than crude, handled in Portland Harbor. The quantities of residual transported through Portland Harbor had increased generally from 665,000 ST in 1961 to 2,203,000 ST in 1971 and then declined in a sawtooth fashion to 837,000 ST in 1982 or approximately 38% of the 1971 level. The industrial and electrical generating sectors are the major consumers of residual fuel oil. Other large uses are commercial, institutional and governmental.

Judging from residual oil use in Maine during the 1973-83 period, the Maine Office of Energy Resources (MOER) does not see any clear trends. Consumption of residual oil peaked in the early 1970's but has remained somewhat constant since that time. According to MOER, it may be that fuel conservation and measures to convert to other energy sources having been offset by increases in demand by new uses of the fuel. However, the statistics for residual oil handled in Portland Harbor between 1971 and 1982 show a definite decline. Discussions with oil terminal operators indicate that industrial use of residual, particularly for the paper industries, has decreased dramatically of late due to conversions to alternative energy supplies and in particular the paper mills to wood by-products.

MOER predicts that industrial energy consumption will increase 30% between 1982 and 2000 but that petroleum product consumption by this sector will rise 10% in the 1980's only to decline to its 1982 level in the year 2000. MOER assumed that the use of wood, coal, industrial hydropower and cogeneration would increase by 45% by the year 2000. However, local sources of information in Portland indicate that conversions to coal have not materialized to the extent expected because of the environmental problems (unsightliness, coal dust, etc.) associated with handling it.

The forecasts of demand for residual oil in the area served by Portland Harbor are based on:

- relatively stable prices for oil,

- the service area will not be a major economic growth area,

- the continued conversion of oil burning boilers of paper companies and wood products firms to wood and wood by-products as demonstrated by S. D. Warren, a paper mill located in the Greater Portland area,

- limited conversions to coal generation by the electrical utilities,

- conversions to nuclear and hydropower for the generation of electricity,

- the continued purchase of electricity produced in other New England states and in Canada by the State of Maine.

Residual demand is predicted to rise at a 1% annual rate throughout the entire 50 year period of analysis for this study to approximately 2,600,000 ST in the year 2035 or an increase of 18% over the 1971 level of demand.

Distillate Fuel Oil (No. 2), used primarily for residential and commercial heating, has in recent years constituted about one quarter of petroleum products (exclusive of crude oil) received and shipped in Portland Harbor. In 1961, distillate made up about 35% of these petroleum products. The amounts of distillate handled in Portland Harbor since say 1961 reflect closely the changing space heating habits of the residential and commercial sectors in response to the rising cost of distillate between 1973 and 1981. The quantities of distillate transported through Portland Harbor rose from 1,257,000 ST in 1961, leveled off to between 1,000,000 and 2,000,000 ST during the 1971-73 period only to peak at 2,222,000 ST in 1974 and thereafter to decline about 56% to 1,248,000 ST in 1982. According to the Social Science Research Institute (SSRI) of the University of Maine, the percentage of households consuming distillate fuel oil in the State of Maine has not declined significantly since 1974. Consumers have adopted measures to reduce fuel usage and supplemented their oil fired furnaces with wood or coal stoves. The price decline since 1981 has not reversed the trend of declining consumption although there is much less economic incentive for conversion from oil to other forms of energy.

MOER forecasts an annual 0.5% increase in energy consumption for residences between 1982 and 2000 but an overall decline of 35% for fuel oil use for home heating due to conversion to wood, solar and coal use. Commercial sector energy is expected to decline by 15% for the same period and petroleum consumption would drop by 35%.

Assuming that conversions to other forms of energy will proceed but not to the extent predicted by MOER because, for example, of the inconveniences of coal elaborated above, a return to the 1974 peak demand is forecast for the year 2035, representing an annual increase of a little more than 1% per year.

The quantities of kerosene and jet fuel moving in and out of Portland Harbor are currently not very important and are expected to remain so. The sharp decline in kerosene use between 1961 and 1982 is likely due to

the declining use of the old-fashioned kerosene stove which are expensive and inefficient to run. There is, however, a new low-sulphur kerosene suitable for portable space heaters.

Non-petroleum products traffic through Portland Harbor constitutes between less than 1% of total traffic and a maximum of 4% between 1971 and 1982. See Tables 3 and 4. These commodities varied from 35,000 ST to 454,000 ST. Principal commodities have been pulp, paper products, fish, vegetables, and gum and wood chemicals. Since 1982, coal, scrap, urea and salt have dominated the commodity mix of non-petroleum traffic.

Discussions above on the future plans of Merrill's Marine Terminal, the Maine Department of Transportation (MDOT), and the Guilford Transportation Industries reveal the lack of a basis for predicting a sizeable growth in dry cargo traffic in Portland Harbor, the transportation of which could benefit from a deepening of Portland Harbor. The container feeder service proposed by MDOT would not require a deepened Fore River Channel. Concerning bulk and break-bulk cargo, other U.S. and Canadian ports appear to have competitive advantages over Portland Harbor which will not be easy to overcome. Although its aggressive marketing skills are noteworthy, Merrill's experience as a marine terminal operator has been established only since 1982. However, Merrill has indicated it is highly probable that he would breast a floating crane alongside of his existing pier and undertake some dredging if the Fore River Channel were deepened and market conditions were favorable.

Table 5 presents past and projected quantities of petroleum products traffic, other than crude, in Portland Harbor. Compared to MOER's forecasts of demand for petroleum products in Maine up to the year 2000, the projections in Table 4 are considered to be a high growth rate future for Portland Harbor. Projected demand in the year 2000 approximates that of actual consumption in 1971.

Current Vessel Fleet and Future Trends

The discussion here is limited to both self propelled and non-self propelled tanker traffic. Virtually all deeper draft vessel traffic entering Portland Harbor carries petroleum products. The number of tankers having a draft of more than 19 feet has declined dramatically by 60% from 771 vessels in 1970 to 307 in 1982. See Table 6. The composition of this traffic has changed significantly also. Non-self propelled vessels made up primarily of barges constituted 7% of this traffic in 1970 and 36% in 1982. The decline in total traffic is primarily attributable to the decreased demand for crude oil in Canada via the Portland Pipe Line Corporation (PPLC) facility and also due to falling demand for gasoline, and distillate, and residual fuels in the area served by Portland Harbor

Table 6
Portland Harbor
Historical Record of Inbound Tanker Trips and Drafts of Vessels

	1982		1981		1980		1979		1978		1977		1976		1975		1974		1973		1972		1971		1970		1969	
Draft (ft)	SPV	NSPV	SPV	NSPV	SPV	NSPV	SPV	NSPV	SPV	NSPV	SPV	NSPV	SPV	NSPV	SPV	NSPV	SPV	NSPV	SPV	NSPV	SPV	NSPV	SPV	NSPV	SPV	NSPV	SPV	NSPV
51																							1		1		1	
50																							--		1		--	
49																							4		--		2	
48																							1		1		3	
47																			1		1		1		1		1	
46	4												4		2		1		2		1		3		2		1	
45	6		23		15		19		21		34		51		56		25		32		22		25		16		7	
44	5		10		13		11		17		23		33		39		43		47		27		18		26		18	
43	6		7		13		8		6		14		27		31		36		45		34		19		34		48	
42	3		7		8		12		22		27		49		33		32		32		22		34		39		20	
41	8		20		8		10		4		10		16		26		16		26		30		41		53		23	
40	7		12		10		15		8		12		25		45		32		52		54		77		71		36	
39	5		11		5		4		11		17		35		65		85		71		82		77		54		61	
38	12		8		11		6		24		31		47	1	48	1	44	1	71		103		82	1	78		111	
37	12		8		7		8		8		17		40		30	2	60	2	35		49		46		44		55	
36	14		12		13		10		20		20	1	8	1	9		52	3	34		46		42	1	43		37	
35	13		20		29	1	25		32		26		23		16		44	1	53		50		35		47		38	
34	20		26		23		18		33	1	38		26		32		29		31		26		29		29		18	
33	15		13		15		38		30		26		17		30		18		30		27		43		26		17	
32	17	5	17	4	34		21	4	25	5	27		31	5	23	6	41	7	33	3	33		35	8	30		27	
31	7	1	10	2	8	9	19	13	7	2	8	5	10	1	17	2	21	5	31	1	34		29	3	47		95	
30	5	5	7	5	5	1	7	1	1		9		8	2	11		14	1	7		14		17	1	11		8	
29	2	6	6	15	3	2	3	1	1	1	5	2	1	1	7	1	1	1	8		8		2		7		3	
28	5	5	9	4	10	3	8	5	2	6	3		6	6	6	6	6	5	5		9		6		5		3	
27	7	2	5	3	5	1	3	3	4	5	2	4	3	6	5	3	6	2	12		6		6	3	11		5	
26	7	3	2	5	5	8	6	1	5	2	6	4	8	6	7	3	10	3	10		7	1	5	2	5		8	
25	3	6	6	4	4	3	4	2	2	2	2	7	3	3	5	2	3	1	9	1	12	2	8		17		14	
24	6	12	2	14	4	1	3	1	2	10	8	1	4	3	6	2	12		9	1	4		11	6	6	12	6	
23	5	8	1	6	1	4	2	1	3	1	2	5	2	4	6	1	3	1	7	2	8	1	5	10	5	3	4	5
22	--	9	1	3		3	2	4	4	20	2	14	3	12	2	4	9	4	3	3	6	3	1	4	3	13	5	10
21	2	15	1	3	2	14	2	16	4	11	1	11	1	12	8	7	3	8	6	3	5	3	1	2	2	15		11
20	1	16	--	16	1	12	2	27	1	20	7	6	1	4		6	1	11	6	10		6	1	4		7	3	8
19	1	16	1	18	1	20	4	12	1	7	3	1	1	4	2	2	2	2		3		2	1	6		6		2
Sub-Total	198	109	245	102	253	82	270	91	298	93	380	61	483	71	567	48	649	58	708	27	720	18	706	51	715	56	678	36
18 feet & Less	273	158	270	209	453	179	312	220	722	187	903	189	724	170	942	147	982	149	1078	130	1018	146	928	249	842	256	933	231
TOTALS	471	267	515	311	706	261	582	311	1020	280	1283	250	1207	241	1509	195	1631	207	1786	157	1738	164	1634	300	1557	312	1611	267
Grand Totals	738		826		967		893		1300		1533		1448		1704		1838		1943		1902		1934		1869		1878	
19-51 Foot draft tankers																												
NSPV's as a percent of total	36		29		24		25		24		14		13		8		8		4		2		7		7		5	

SPV = Self propelled vessels NSVP = Non self propelled vessels

Source: Department of the Army, Waterborne Commerce in the United States

in Maine and southeastern New Hampshire. PPLC is the sole receiving terminal for crude oil in Portland Harbor and virtually all of it is transported through its Pier #2. All of the crude is destined for refineries in Montreal. Pier #2 has a 48 foot draft and is located outside of the area which would be served by the possible deepening of the Fore River Channel.

Table 7 presents estimates of adjusted inbound tanker traffic for the 1974-82 period to reflect only non-crude carrying tankers. Concerning this traffic, the 1982 level was approximately one-half of the 1974 figure and the composition of non self propelled vessels increased from 15% to 41%. Also one notes a decline in the number of tankers having drafts of more than 34 feet except for 1982. Although these vessels have had to move into the harbor on the tides, their numbers are relatively insignificant. Traffic at the Texaco terminal may be indicative of trends since 1981, the most recent year for which official commercial statistics are available for Portland Harbor. Interviews at Texaco reveal that traffic has declined dramatically in the past several years due to the conversion from oil to other energy use. Notably, paper mills have converted to wood byproducts for their energy needs. Traffic declined from 12 tankers and 123 barges in 1981 to 2 tankers and 40 barges in 1983. Available information for 1984 reveals that a higher proportion of tanker traffic may reflect lower overseas refining costs. This phenomenon is considered to be a temporary one at the present time.

Discussions with other oil terminal operators confirm the trend towards more barges and integrated tug and barge units in lieu of tankers up to and beyond the 1984 period for transporting petroleum products, other than crude, into Portland Harbor. The advantages of cost (capital outlay and recurrent costs), lower labor requirements and faster turn around time more than balance the inconveniences of lower operating speeds, less reliability in inclement weather and less maneuverability. The barges currently in use in Portland Harbor, of which the maximum is about 22,000 DWT are fully capable of navigating the present 35 foot channel. Additionally, oil terminal operators foresee a declining, or at best a slow growing, market for their product. During the present oil glut and with the possibility of further price decreases, they prefer to keep inventories low, and for those who are able, to buy on the spot markets in the Boston and New York-New Jersey areas. Under these circumstances, the oil companies plan on favoring barges for the transport of their petroleum product. These would fully capable of navigating the existing 35 foot deep Fore River Channel.

Twenty-eight vessels comprised of 20 ships and 8 barges serviced general and dry bulk cargo in the Fore River Channel in 1984. Several of the ships carrying scrap and urea had theoretical drafts in excess of 35 feet.

Table 7
Portland Harbor
Estimate-Number of Tankers (Other Than Carrying Crude Oil), 1974 - 1982

	1982		1981		1980		1979		1978		1977		1976		1975		1974	
	SPV	NSPV	SPV	NSPV	SPV	NSPV	SPV	NPSV	SPV	NSPV	SPV	NSPV	SPV	NSPV	SPV	NSPV	SPV	NSPV
DRAFT (feet)																		
35-51	7	---	---	---	8	1	17	---	29	---	35	1	23	2	11	3	24	7
19-34	103	109	104	102	121	81	142	91	125	93	149	60	125	69	167	45	179	51
18 and less	273	158	270	209	453	174	312	220	722	187	903	189	724	170	942	147	982	149
Totals	383	267	374	311	582	261	471	311	876	280	1087	250	872	241	1120	195	1185	207
Grand Totals	650		685		843		782		1156		1337		1113		1315		1392	
All Tankers NSPV's as a percent of total			45		31		40		24		19		22		15		15	
19-51 foot Draft Tankers NSPV's as a percent of total			50		39		36		38		25		32		21		22	

SPV - Self propelled vessels

NSPV - Non-self propelled vessels

Sources: - Corps of Engineers, Waterborne Commerce in the United States
- The Portland Pipe Line Corporation, South Portland, Maine

Project Use Without and With Improvements

At present, two major potential constraints exist to the improvement of navigation in the Fore River Channel in Portland Harbor: the narrow width (98 feet) of the navigation opening of the Portland Bridge and 35 foot below MLW channel depth. The economic feasibility of replacing or repairing the Portland Bridge has been addressed in a series of studies, the latest of which was completed in September, 1983.[27] Nearly three-quarters of the total benefits for justifying the alternatives costing between an estimated $58 to 83 million are those due to waterborne transportation on the existing 35 foot deep waterway. The growth in refined petroleum products traffic was projected to 9,000,000 short tons in 2035. The increased use of tankers in lieu of barges was forecast for the movement of refined petroleum through Portland Harbor. The question of the feasibility of deepening the harbor is addressed in this present report.

With or without the deepening of the Fore River Channel in Portland Harbor, traffic growth is expected to be moderate and will not exceed past traffic levels until nearly the twenty-first century. See Table 4. Projections of future traffic in the Fore River Channel consist of petroleum products, other than crude oil. The present low level of cargo traffic and the uncertainties concerning its future growth do not warrant detailed forecasts of general cargo traffic. Crude petroleum is received at the Portland Pipe Line Corporation Pier #2, located outside of the Fore River Channel, and then pumped to refineries in Montreal. In 1982, Fore River Channel traffic comprised 4,021,000 tons of refined petroleum products and 324,000 tons of general cargo. Refined petroleum traffic is projected in this present study to approximate its 1971 level in the year 2000 and reach 10,000,000 short tons in the year 2035. These projections exceed those of the Maine Office of Energy Resources and therefore are considered to represent a high growth rate future. General cargo traffic of 324,000 short tons in 1982 is relatively insignificant at present. Although the Maine Department of Transportation and Merrill's Marine Terminal are actively pursuing studies and marketing strategies to create a container feeder service and to attract bulk and break-bulk traffic between Portland Harbor and the American and Canadian West, no rational basis exists at present for projecting large volumes of dry cargo traffic of a magnitude and a nature to require deepening of the Fore River Channel. See pages 11 and 12 for a more detailed discussion of these conclusions. A container feeder facility would not require a deepened harbor.

Interviews with the oil terminal and general cargo users of the Fore River Channel reveal that virtually none of them at present would take advantage of the deepening of the Fore River Channel by co-investing in their piers and berthing facilities in order to take advantage of the economics of scale for transporting their products on larger vessels. With respect to petroleum traffic, the trend is clearly towards more and larger barges which do not require channel deepening and a decline in the number of tankers. Tankers having drafts of more than 35 feet would necessitate entry to the harbor on the tides or require reduction of draft by earlier

offloading at other ports.

The decline in oil and oil products' demand in the area serviced by Portland Harbor and the consequent decrease in oil shipments through Portland could lead to a consolidation of oil terminals through mergers and acquisitions, the shifting of some of the remaining terminals to more attractive sites and a change in land use for the abandoned facilities to recreational, residential and commercial use. The consolidation of oil terminals may make it feasible for the remaining oil terminals with a larger share of the market to consider larger bulk shipments and possibly use larger tankers. This eventuality is not foreseeable at this time.

Merrill's Marine Terminal services virtually all dry bulk and general cargo traffic in the Fore River Channel. If the channel were deepened to 38 feet below MLW, for example, and market conditions favorable, Merrill states that it is highly probable that he would modify his berth and access channel and operations in order to accomodate deeper draft vessels.

Findings

The following findings argue against the deepening of the Fore River Channel at this time.

- With the exception of Merrill's Marine Terminal present and potential users would not modify their operations nor co-invest in improving their piers and berthing facilities so as to take advantage of the deepening of the Fore River Channel.

- The hinterland serviced by Portland Harbor is not expected to be a major growth area. The growth is not expected to be of a nature to require channel improvements. In particular, the energy using sectors are expected to grow modestly.

- Only moderate increases in refined petroleum traffic is predicted through the Fore River Channel in the next 50 years. The trend at this time is clearly to the use of more and larger barges for the transport of refined products. These do not require channel deepening.

- Crude petroleum traffic does not at present use the Fore River Channel. If future Canadian offshore oil were to be shipped through Portland Harbor, it is not likely that the Federal Channel would be used. Crude would probably be transported through the Portland Pipe Line Corporation's Pier #2 located outside of the Fore River Channel.

- Dry bulk and general cargo traffic was approximately 200,000 ST in 1984. Attempts by promoters and terminal operators to extend Portland Harbor's zone of influence to northern Maine, and to the American and Canadian mid-west are noteworthy. It is premature to predict whether certain competitive disadvantages can be overcome to attract traffic from other ports to Portland.

- The creation of a container feeder service would not require the deepening of Portland Harbor.

- The Bath Iron Works began operations in Portland Harbor in late 1983 as an overhaul and repair facility for U.S. Naval and for commercial ships. Given the infancy of BIW's operations in Portland and the lack of a record of accomplishments demonstrating that it can operate competitively to overcome its locational disadvantage in Portland Harbor, it is too soon to predict whether BIW would benefit significantly from the deepening of the Fore River Channel.

- Some vessels having drafts deeper than 35 feet will experience tidal delays or be otherwise (deballasting, multi-port operations, etc.) inconvenienced by the present 35 foot depth of the Fore River Channel. The number of these vessels is not significant and could not themselves justify the deepening of the channel.

Notes

1 Corps of Engineers, New England Division, Water Resources Improvement Study for Navigation in the Fore River, Portland, Maine, July, 1977.

2. Modjeski and Masters, Engineers; T. Y. Lin International; Hunter-Ballew Associates; Charles River Associates, Feasibility Study - Fore River Crossing - Portland - South Portland, September, 1983.

3. C. E. Maguire, Inc. and Robert J. Harmon & Associates, Inc., Benefit-Cost Study, Fore River Channel, 1High Level Bridge-Final Report, October, 1979.

4. Chamber of Commerce of the Greater Portland Region, The Data Book, 1983.

5. Louis A. Ploch, In-migration in Maine Study, 1981.

6. This present study has drawn freely from the document prepared by the South Portland Planning Department entitled, Study of Oil Port Facilities in Portland Harbor, 1982.

7. Carl E. Veazie, Waterfront Economic Base Study for the Greater Portland Region, December, 1980.

8. Booz, Allen and Hamilton, Feasibility Study of General Cargo Port Facilities in Maine, March, 1980.

9. Frederic R. Harris, Inc., Water Resources Improvement Study - Portland Harbor, Maine, September, 1974.

10. The Maine Office of Energy Resources forecasts for petroleum products is contained in, Comprehensive Energy Resources Plan, September, 1983.