Petroleum Storage & Transportation Capacities

Volume V • Waterborne Transportation

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Committee on U.S. Petroleum Inventories, and Storage and Transportation Capacities

Robert V. Sellers, Chairman

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The sole purpose of the National Petroleum Council is to advise, inform, and make recommendations to the Secretary of Energy on any matter requested by the Secretary relating to petroleum or the petroleum industry.

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INTRODUCTION AND EXECUTIVE SUMMARY

INTRODUCTION

In June 1978, the Secretary of Energy requested the National Petroleum Council to determine the nation's petroleum and gas storage and transportation capacities as part of the federal government's overall review of emergency preparedness planning (Appendix A). The National Petroleum Council has provided similar studies at the request of the federal government since 1948, most recently the 1967 report entitled U.S. Petroleum and Gas Transportation Capacities and the 1974 report entitled Petroleum Storage Capacity.

To respond to the Secretary's request, the National Petroleum Council established the Committee on U.S. Petroleum Inventories, and Storage and Transportation Capacities, chaired by Robert V. Sellers, Chairman of the Board, Cities Service Company. A Coordinating Subcommittee and five task groups were formed to assist the Committee (Appendix B).

The Waterborne Transportation Task Group, chaired by Charles J. Luellen, Executive Vice President, Ashland Petroleum Company, was established to:

- Update the 1967 NPC inventory of waterborne petroleum transportation equipment, noting equipment age
- Report permanent river and lake facilities
- Include U.S. coastal petroleum receiving facilities with access to U.S. refineries and Puerto Rican and Virgin Island refinery receiving facilities
- Examine constraints on waterborne transportation facilities, such as weather-related (seasonality) and facility-related constraints, with special attention to facility constraints at strategic locations.

Statistical data were obtained from several different government agencies and trade groups including, but not limited to, the Maritime Administration (MARAD), the U.S. Coast Guard, the U.S. Army Corps of Engineers, and the American Waterways Operators, Inc. The responsibility for updating and verifying the accuracy of these data was delegated to the members of the Task Group in accordance with the geographic area of their specific expertise (e.g., east coast, Gulf Coast, Great Lakes, Mississippi River system, etc.). The data were expanded to include facilities in existence, under construction, and/or under construction contract, as of December 31, 1978. Waterborne transportation equipment which carried a valid certificate issued by the U.S. Coast Guard on the effective date was assumed to be in current use, as was equipment under construction and/or under construction contract.

EXECUTIVE SUMMARY

More petroleum is carried by water than is any other commodity. Petroleum commerce in the United States is categorized as either domestic or foreign traffic. Domestic traffic is composed mostly of barges and lake and coastal tankers; foreign commerce is that between the United States and foreign countries by means of oceangoing vessels. Some of the ports that service both forms of traffic are congested and a strain has been placed on facilities due to the increased demand for petroleum-based energy.

The most significant trend in the construction of tank vessels (self-and non-self-propelled) since the 1967 report involves the capacities of the vessels. The total capacity for all tank vessels increased fourfold (from 35 to 168.4 million barrels), with the greatest increase occurring in the capacity of tankships.

The most significant trend regarding petroleum receiving facilities is the development of deepwater port facilities in the coastal waters of the United States which are capable of handling larger tankers of crude oil and which, as a result, lower the overall costs of imported crude oil. The Louisiana Offshore Oil Port (LOOP) project, which is scheduled for completion in 1981, is the first of several planned deepwater ports to actually obtain the necessary permits and operating licenses to proceed. LOOP will have the capacity of receiving 1.4 million barrels of crude oil per day when operational, and will handle the equivalent unloading of some 330 supertankers per year. LOOP and its associated pipeline system (LOCAP) are also projected to displace about 85 percent of the crude oil movements that are presently being transported on the lower Mississippi River in small tankers to discharge crude oil at terminals, refineries, and pipeline receiving facilities located between New Orleans and Baton Rouge. With the United States' growing dependence on imported crude oil and the volume of small tanker traffic in the lower Mississippi River, LOOP will be a major factor in lessening concerns over the crowded waterways in that area of the country.

In the past 40 years, tonnage shipped on the nation's inland waterways has more than tripled and the average length of haul has increased from 50 to 375 miles. Rapid technological development has led to vast improvements in productivity. Development of the medium speed diesel engine, the Kort nozzle, the tunnel hull, the swing indicator, radar, and telecommunications has enabled operators to increase maximum tow size from 5,000 to 30,000 tons. Marine operating systems are, however, presently reaching the physical limitations of the inland waterways system. Past increases in productivity have given way to a more modest pace of improvement in hardware and operations in recent years. Evolutionary refinements have replaced revolutionary changes as technology advances. To keep pace with increased tonnage, research and development activities in waterborne transportation must look to the industry's related activities in areas other than floating equipment to maintain or improve productivity.

Several constraints to the waterborne transportation industry are considered within this report, including:

- Weather considerations that shorten navigational seasons on the inland waterways through icing or flooding (e.g., the shortening of the Great Lakes season by winter weather)

- Low water, not generally cited but posing a real threat to navigation

- The influence of local, state, and federal statutes on the maritime industry

- The critical shortage of manpower, particularly on the Great Lakes

- Creeping inflation, which can alter cost decisions on projects deemed a critical need by waterways users.

Restrictions on the waterborne transportation industry classified as "attendant services constraints" generally include:

- Limitations of terminals and material handling equipment

- Ineffective aids to navigation

- Uncertainty of availability and quality of fleeting areas and fleeting services

- Insufficient communication system

- Interference by pleasure craft

- Lack of ready availability of manpower to the waterborne transportation industry.

Improving port facilities and cargo handling techniques would complement the advanced technology of tug barge operations and contribute to improved productivity on the inland waterways.

The increasing demands on waterways transportation to provide the services necessary for moving crude oil and petroleum products to satisfy the nation's needs make continued improvements to the navigational systems mandatory.

Planned development of an effective inland waterways system requires an in-depth analysis and comparison of the current system's capabilities and projection of growth potential in order to determine the best use of available resources.

INDUSTRY OVERVIEW

GENERAL

Subsequent to Colonel Drake's discovery of oil near Titusville, Pennsylvania, waterborne transportation of crude oil was limited to river flatboats hauling upright wooden barrels on their decks. With the development of the Spindletop Field near Beaumont, Texas, in the early 1900's, the intercoastal crude oil tanker trade was launched from the Gulf Coast to refineries in the northeast, which at that time were beginning to lose their Pennsylvania supplies. Since then, tonnage movements in both categories have grown considerably as a natural consequence of the growth in the nation's population and industry and the particular economics inherent in the waterborne transportation industry.

There are two types of waterborne petroleum commerce in the United States: domestic traffic, which includes all commercial traffic between points in the United States (including Alaska and Hawaii) and Puerto Rico, and foreign traffic. Domestic traffic consists mostly of barges and lake and coastal tankers. Foreign traffic includes all movements between the United States and foreign countries. Practically all of these movements are handled by oceangoing tankers. Both types of transportation use some of the same ports, and since both have transported increased volumes in recent years because of the nation's increased demand for petroleum-based energy, a strain has been placed on some of the facilities.

More petroleum is carried by water than is any other commodity. However, the mix of petroleum cargoes carried in domestic commerce is substantially different from that carried in foreign traffic, which is dominated by imports of foreign crude oil from the Middle East, North Africa, South America, Indonesia, and Nigeria. The largest volume of imported petroleum product is residual fuel oil, because domestic refineries are designed to produce maximum yields of motor gasoline and other light end products. Utilities and industrial users, particularly along the east coast, historically have imported residual fuel oil as a boiler fuel from foreign sources. In domestic waterborne traffic, however, the various streams of petroleum products produced by U.S. refineries lead to a quite different cargo mix (Figure 1). Residual fuel oil (rather than crude oil) is moved in the greatest volume and is closely followed by gasoline, middle distillate fuel oils, crude oil, and relatively large volumes of other refined products.

A significant volume of petroleum products is transported on the Great Lakes in spite of the natural interruptions to that area's navigation season. Petroleum products transported on the Great Lakes are handled by self-propelled tankers and tug barges ranging in size from 20,000 to 75,000 barrels. For ship bunkering in harbors, smaller self-propelled units and barges are used.

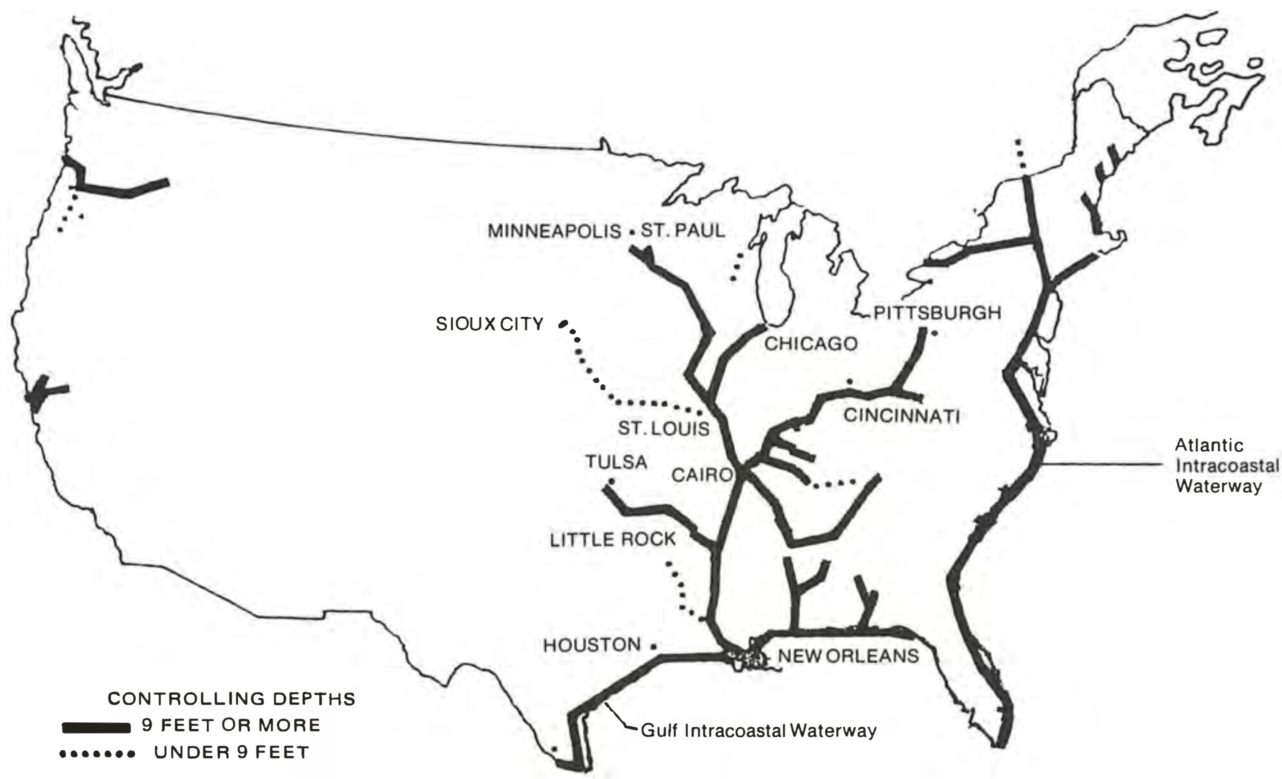
SOURCE: Adapted from *Final Environmental Impact Statement, Title XI;* U.S. Department of Commerce, Maritime Administration, February 1979.

Figure 1. Location of Refineries and Tanker Terminals Accessible from the Coast.

INLAND WATERWAYS

The inland waterways industry consists of some 1,800 towing companies operating on more than 25,000 miles of inland waterways which serve 87 percent of the major cities in the nation. The inland fleet amounts to over 4,300 towboats and tugs with a combined horsepower equivalent of 6.1 million. Tank barges number 3,971 with a total capacity of 71.3 million barrels. Not all of the 1,800 towing companies carry petroleum, and some carry many different commodities in addition to petroleum.[1]

The 25,000 miles of inland waterways which constitute the inland waterways system of the United States include navigable rivers, intracoastal waterways, canals, channels, and other waterways (Figure 2). In order to be considered navigable, a waterway must permit the movement of a sufficient quantity of products to be commercially economic. Water depth, the width of the waterway, and the navigability of its bends, locks, and channels are important. Nearly 25 percent of the total inland waterways system is less than six feet deep and almost 80 percent is less than 14 feet deep.



SOURCE: Adapted from *Final Environmental Impact Statement, Title XI;* U.S. Department of Commerce, Maritime Administration, February 1979.

Figure 2. Commercially Navigable Waterways of the United States.

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[1]American Waterways Operators, Inc.

Thus, draft and length limits are imposed on the commercial traffic operating on the inland waterways system.

Tank barges, pushed by towboats and pulled by tugboats, are the second largest domestic means of moving petroleum, preceded only by pipelines. A towboat may push as many as 20 barges in push-towing operations and a tugboat may pull as many as four in pull-towing operations, depending upon the type of service and the characteristics of the waterways segment on which the operation is conducted. The ability to push large numbers of barges permits the formation of flotillas with capacities of up to 200,000 barrels; in most cases, however, local restrictions dictate smaller flotillas with smaller carrying capacities. The method of towing and the size of the tow is generally determined by the type of water that is being travelled, which in turn dictates the type of power unit (either towboat or tug). The time it takes to travel from the origin to the destination point is affected by the particular characteristics of the waterway and its condition, lockage constraints, the size of the tow, and the horsepower capability of the towing vessel in relation to the size of its tow.

Most inland water routes are well protected and have relatively calm waters. Some rivers, such as the upper Mississippi, the Ohio, and the Missouri, are naturally calm, but a system of locks and dams ensures the relatively calm conditions of the waterway by decreasing the gradient, impeding the water flow, and maintaining a navigable pool of water above the facility. The Mississippi River between St. Louis and New Orleans is an open river (i.e., with no locks); it does, however, allow push towing. In such waters, the towboat is preferred because it can operate in shallower areas and can push more barges than a tug can pull. The primary advantage of push towing over pull towing is that the power unit working at the rear of the tow can maneuver a greater number of barges at a greater speed and under better control.

Towboats are flat bottomed and diesel powered, and are normally equipped with multiple rudders which afford maximum control as required in the navigation of narrow channels, rivers, and canals. They are scow-shaped at the bow and nearly square at the stern; the deck is within three to five feet of the waterline, because a towboat's travel is limited to inland waterways where large waves are not encountered.

The tugboat used in deep water ports and along the coast is as powerful and efficient as a towboat but has a shaped bow, rides higher in the water, and is more streamlined.

Both towboats and tugboats are built to precise design specifications and are equipped with the most modern navigation equipment and safety devices, including radio telephone, radar, depth sounding equipment, engine room monitoring, and pilot house control of the main engines.

Barges are towed or pulled behind on a hawser or are snugged up alongside the tug. Articulated tug barges are gaining increasing acceptance for transportation along the coast and for trips to and from the Caribbean. Barges can be pushed by a tugboat with relatively modest equipment modifications.

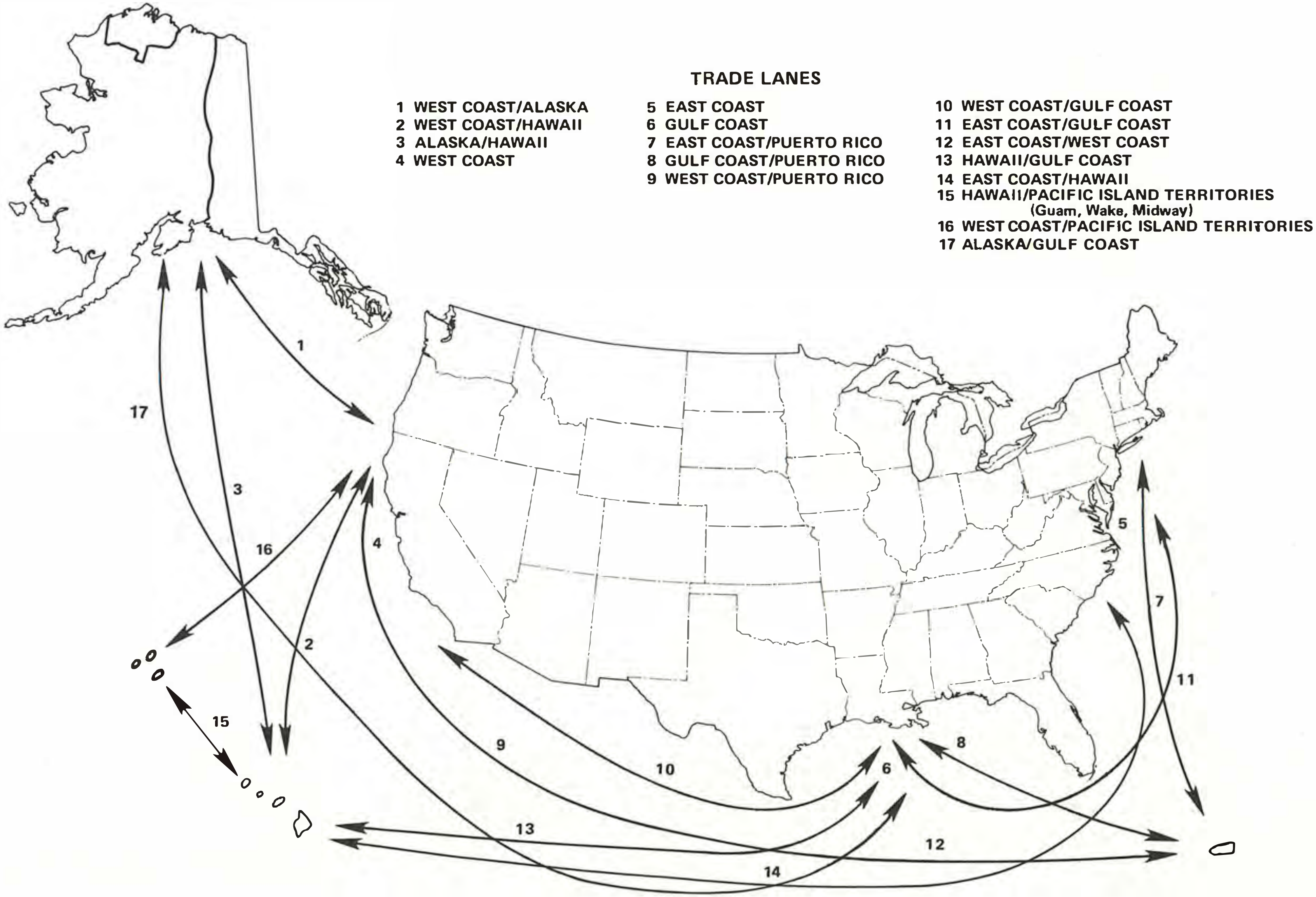
Individual towboats are often designed for the characteristics of the waterways segment on which they will operate. Because the navigational conditions vary considerably from one part of the waterways system to another, inland water transporters often assign individual towboats to a specific segment. Certain points along the waterways system, such as the mouths of the Ohio, Illinois, Tennessee, and Missouri Rivers, are key breakout sites for the rearranging of tows, and towing and routing procedures. The Mississippi River system and the Gulf Intracoastal Canal carry 76 percent of the United States' domestic waterborne petroleum traffic.

On the intercoastal canals, in the Gulf of Mexico, off the Atlantic and Pacific Coasts, and between the Pacific Coast and Alaska and Hawaii, open water towing is done by tugs. The V-shaped model bow and higher decks are better suited to this type of travel in rough water and strong wind conditions than towboats, and the reduced maneuverability of the tow is not as critical as it would be on narrow inland waterways.

Although inland waterways barges and several pipelines serve the same general regions in the west central United States, they do not share regions along the Ohio River Valley. Barges handle some heavy products that cannot be transported by pipeline (such as residual fuel oil and asphalt) and are subject to interruptions and delays due to weather. It is for these reasons that barged petroleum does not, in most cases, compete head-to-head with crude oil and products that are transported by pipeline. Instead, barges supplement pipeline deliveries and take primary responsibility for the transportation of products, specialty petrochemicals, and crude oil not shipped by pipeline.

MARITIME CARRIERS

Coastal tankers and tug barges are especially important in the transportation of petroleum along the U.S. coast (Figure 3). Tankers of between 17,000 and 50,000 deadweight tons (DWT) are most prominent in the carriage of petroleum products, of which gasoline is the largest quantity. A growing percentage of product is moved by barge, but of growing importance is the new integrated tug barge concept. Crude oil movements from Alaska to the west coast and to the Gulf and east coasts via the Panama Canal have reached substantial levels in the past several years utilizing various sizes of tankers, including very large crude carriers (VLCC's). Most of the coastal tankers average 16.5 knots. Tankers and barges of a smaller size (up to 35,000 DWT) can generally be loaded or unloaded in 24 hours under ideal conditions, while the large tankers require between 24 and 36 hours.



SOURCE: Adapted from *Final Environmental Impact Statement, Title XI;* U.S. Department of Commerce, Maritime Administration, February 1979.

Figure 3. Domestic Waterborne Trade Lanes.

In recent years, ocean barging has become an important factor in petroleum transportation, and greater use is likely in the future. These large vessels (of up to 45,000 DWT) are either pushed or pulled by oceangoing tugs. The smaller oceangoing barges are commonly used to supply fuels to nearby refineries, urban centers, or transshipment points. The larger ones operate much as self-propelled coastal tankers do.

Despite its size and cargo, the oceangoing tanker is basically a large, strong metal tank which is subdivided into smaller tank compartments and is narrow in the bow and stern. The power unit and control system are located in the stern. Of major concern in the design of the oceangoing tanker are the service requirements which determine whether a ship will be a large one built to transport crude oil between a limited number of ports, or a smaller, specialized vessel built to move refined products shorter distances; limiting dimensions, including draft, beam, and length, which combine to dictate the amount of deadweight that can be lifted by the hull; and speed, which is largely dependent upon the power available and the shape of the hull. The annual cargo-carrying capacity of a tanker is increased as a function of its speed since turnaround time is reduced.

Scheduled maintenance is a major part of the operating costs of a tanker. Drydocking for extensive maintenance activity typically occurs on a biannual basis.

SIGNIFICANT TRENDS

GENERAL

The following sections present an examination of the more significant developments and trends in the industry -- developments and trends which evolved from the need to maintain a competitive, efficient, and safe waterborne transportation industry to serve the nation.

INLAND WATERWAYS

In the past 40 years, tonnage shipped on the nation's inland waterways has more than tripled and the average length of haul has increased from 50 to 375 miles. Rapid technological development has led to vast improvements in productivity. Development of the medium speed diesel engine, the Kort nozzle, the tunnel hull, the swing indicator, radar, and telecommunications has enabled operators to increase maximum tow size from 5,000 to 30,000 tons. Marine operating systems are, however, presently reaching the physical limitations of the inland waterways system. Past increases in productivity have given way to a more modest pace of improvement in hardware and operations in recent years. Evolutionary refinements have replaced revolutionary changes as technology advances. To keep pace with increased tonnage, research and development activities in waterborne transportation must look to the industry's related activities in areas other than floating equipment to maintain or improve productivity.

The modern design features of barges permit the assembly of integrated tows consisting of several barges with a combined underwater shape resembling that of a single unit. The water resistance of an integrated tow is nearly equivalent to that of a single vessel of the same length; the squared ends of the individual units, which also result in increased capacity, lend added buoyancy to the unit.

Improved utilization and handling characteristics of tows and towing vessels can contribute directly to more efficient and economic operations. Such methods increase productivity through a reduction in transit time and an increase in both marine and environmental safety. For example, a bow steering control system can significantly improve tow maneuverability, thereby reducing waterways accidents and resultant pollution and safety problems. In addition, as the operational capability of towboats increases, fuel consumption decreases.

Research projects which could result in significant near-term improvements to equipment performance and service life, environmental protection, and personnel safety include increased horsepower per propeller shaft (present technology places a 3,500 horsepower limit on single propeller shaft towboats operating in nine-foot channels); and engine room noise abatement. (The basic towboat engine room has difficulty meeting the Occupational Safety and Health Administration's [OSHA] noise levels. Studies are needed to develop methods of isolating vibrations and reducing noise to acceptable levels).

Because of the recent rapid growth of the waterborne transportation industry and the need for construction of new equipment, much of the inland fleet is relatively modern. Fleet growth has resulted in additions, modernization, and replacement as required.

In recent years the shallow-draft water carriers have sought financing from outside sources. Prior to 1969 the industry's primary source of capital was provided through bank financing. Only during the last 10 years has the inland waterways industry been able to meet its capital demands with the assistance of government-guaranteed financing under Title XI of the Merchant Marine Act of 1936, as amended. Nevertheless, a substantial amount of equity capital is still required to participate in this program. In addition, all of the fees incurred in arranging the financing are not covered under Title XI and some must therefore be met through working capital. For some very small operators, the complexity and costs of the existing Title XI program make bank financing and leasing the only available sources of capital.

The leveraged lease has become an alternative financing mechanism for many companies. Under a leveraged lease, a finance company or bank will supply 100 percent of the funds necessary to acquire marine equipment. The leasing company, as owner of the equipment, obtains Title XI financing for as much as is permitted by law and provides the equity capital for the balance. The leasing company receives tax benefits and shares these benefits with the operator through a lower effective interest rate, as reflected in the lease cost or purchase options.

MARITIME CARRIERS

U.S. flag tankers engaged in foreign commerce receive several important benefits from the federal government. Construction subsidies and operating differential subsidies paid through the Maritime Administration are intended to offset the lower capital, labor, and operating costs of foreign companies, most of which are either government-owned or government-subsidized. A significant level of protection from foreign competition is provided by cabotage laws such as the Jones Act, which requires that all commodities, including petroleum, be transported from one U.S. port to another in U.S.-built and U.S. flag vessels. Since federal subsidy is not applicable to those vessels trading under Jones Act protection (U.S. port-to-U.S. port), U.S. flag vessels receiving subsidies are prohibited from operating in U.S.-to-U.S. trade except under special conditions. Without subsidies and cabotage laws, foreign operators would, presumably, undercut the charges of domestic operators by the difference in the lower costs, which could eventually force domestic operators and shipbuilders out of business.

To help maintain a domestic shipbuilding industry in the face of overseas competition, the cabotage laws also require that vessels be constructed in the United States. This results in higher transportation costs for domestic shippers of petroleum, but it is offset to some extent by the security and employment aspects of supporting a transportation industry of strategic importance.

Nonsubsidized tankers from the U.S. Flag Fleet are seldom used in international trade because higher labor costs and operating expenses make the U.S. fleet relatively uneconomic when compared to many foreign flag fleets. Higher safety and equipment standards for U.S. flag vessels also add to this expense and the future financial impact of the Port and Tanker Safety Act of 1978 remains to be seen. Nonsubsidized U.S. flag tankers and barges are used instead in coastal runs for which the Jones Act requires that a vessel be built and registered in the United States and manned by American seamen.

The cost of building a tanker for the U.S. Flag Fleet is not directly proportional to its size. A large hull costs considerably less per DWT than a smaller one, and the cost of machinery, accommodations, and cargo handling equipment does not increase greatly with size. The cost of a large ship is only about 85 percent of the combined costs of two ships of half the size. This gives the larger ship a cost advantage which is generally reflected in its lower unit charges. Even though operating costs (insurance premiums, stores, repair and maintenance, wages, provisions, and administration) rise in absolute terms as ship size increases, these costs become progressively smaller as related to capacity. But because of limited port facilities, the largest estimated fully loaded tanker that can be handled in the U.S. east and Gulf Coast areas is only about 80,000 DWT, with limitations of 40,000 to 50,000 DWT in most ports, although some west coast ports are capable of accommodating fully loaded tankers of up to 150,000 DWT (Table 1). The development of the supertanker of over 175,000 DWT has thus had two significant effects on the United States: it drastically reduced the transportation component of imported oil costs, and it prompted the establishment of off-loading points in the Caribbean where cargoes could be transferred to smaller tankers which could tolerate the shallow draft of U.S. ports.

The primary competition of coastal tankers is the network of petroleum product pipelines which has changed the economics and flow pattern of products moving to the northeastern United States from Gulf Coast refineries. A substantial coastal trade in petroleum products will continue, however, since the pipelines cannot carry residual fuel oil or other heavy products, and import quantities of both crude oil and petroleum products may increase every year. Thus, the relative share of tankers as a mode of petroleum transportation will increase. The level of investment in tanker transportation on the part of the U.S. oil industry, mostly in the form of ownership of foreign flag tankers and deepwater ports, may be affected by this trend.

TABLE 1

Controlling Depth and Maximum Permissible Size Vessels For Some Contiguous Ports

Port or Harbor Area	Controlling Depth (Feet)	Estimated Maximum Permissible Vessel Size When Fully Loaded (DWT)
East Coast		
Delaware River Ports	40	53,000
Hampton Roads, VA	45	80,000
New York, NY	35	40,000
Portland, ME	45	80,000
Baltimore, MD	42	53,000
Boston, MA	40	40,000
Gulf Coast		
New Orleans, LA	40	50,000
Tampa, FL	34	35,000
Baton Rouge, LA	40	50,000
Mobile, AL	40	45,000
Corpus Christi, TX	45	50,000
Houston, TX	40	50,000
Brownsville, TX	36	30,000
Pascagoula, MS	38	35,000
Pacific Coast		
Long Beach, CA	52	150,000*
Los Angeles, CA	51	150,000
San Francisco Bay Ports	35	40,000
Puget Sound, WA	73	250,000†

SOURCE: US-124, Shipping Data, Waterborne, U.S. Department of Commerce, Maritime Administration Tanker Construction Program, Final EIS AN 73-0725-F, Washington, D.C.

*Vessels of up to 165,000 DWT have been permitted recently to enter the waters of Long Beach, California.

†No vessels exceeding 125,000 DWT are permitted to enter the waters of Puget Sound in accordance with Washington state law.

PRINCIPAL CONSTRAINTS

The waterborne transportation industry is beset by operational constraints that hamper efficiency, increase costs, and reduce flexibility. The more serious constraints affecting the waterborne transportation industry are noted in this section. The scope of this study precludes a thorough, in-depth examination of the origin, effect, and disposition of these constraints; however, recognition of them and their impact is necessary in order to understand the operational difficulties inherent in today's waterborne transportation movements.

NATURAL AND PHYSICAL

Natural and physical constraints can be classified into four general areas: weather, marine routes, navigational structures (locks and dams, bridges, ports, and harbors), and attendant services.

Weather considerations adversely affecting the efficient operation of the waterborne transportation industry (and in particular, the fleets operating in the upper or northern portions of the inland waterways and the Great Lakes) are beyond the effective control of the industry and the governmental agencies responsible for the maintenance of the waterways. Such constraints include ice and storms, high water and flooding, drought, and fog. Winter operations on the Great Lakes and upper Mississippi and Ohio River waterways are limited by ice formations and severe storm conditions that occur annually but on an unpredictable basis. Problems with ice on the inland waterways involve the locks and dams as well as the rivers themselves and include broken ice in lock chambers, buildup of ice on lock walls and gates, freezing of lock valves, and passing ice at navigational dams. Ice problems to be expected in the rivers include ice buildup on the bottom and front of tows and ice gorges. On the Great Lakes, ice formations are generally so extensive that they actually close down all water movements except for those essential to public welfare, and even these movements are made only with U.S. Coast Guard cutter escort and/or specially constructed all-weather tankers and barges.

The effects of severe ice conditions on both the waterways industry and the entities it serves are extensive. Waterways operations during the winter of 1976-77 were cut 25 to 75 percent. Small horsepower boats are not powerful enough to push through the ice cover and are kept inactive. The only effective measures to break up the frozen water passages have been those taken by the operators in risking their more powerful vessels on the river in an attempt to clear and maintain a passable channel and in utilizing specially constructed tankers and/or a cutter escort to traverse limited segments of the Great Lakes.

Flooding on the upper Mississippi River system, caused largely by floodwaters which originate from tributary streams that flow into the main stem, has been a major problem in years past, and this situation is expected to continue. The record floods of April 1965 and spring 1973 caused widespread damage along the river and its tributary streams. Mississippi River floods normally occur during the spring runoff period between April and June. During periods of high flow, operating machinery at the locks and dams is removed, rendering the locks inoperable. There are no feasible reservoir sites along the main stem of the Mississippi River because of the highly developed nature of the flood plain. Reservoirs on the large tributary streams and local flood protection projects and flood plain management practices along the main stem appear to be the best solutions to the flood problem.

Low water conditions on the inland waterways system can have as serious an effect on the efficient operation of the waterborne transportation industry as can flooding. Low water conditions not only force barge operators to navigate with lighter loads to avoid grounding, but also cause them to cut the size of their tows since maneuverability is impaired as water level drops. When an operator cuts the draft of the barge, additional boats and barges must be used to carry the same volume of cargo. Reducing the draft by one foot lessens the payload of a single barge 200 to 600 tons, depending upon its size. In addition, the cost of moving a lightly loaded barge is nearly the same as a fully loaded one. Low water conditions increase transit times, adding from one to two days to the normal five-day trip from St. Louis to New Orleans. As a result, freight rates must be increased to cover the additional costs.

Another serious effect of low water conditions (as well as of high water and flooding) is the creation of shifting channels which require dredging and the replacement and repositioning of many channel buoys and navigational markers. Thus, additional and more frequent dredging must be undertaken by the Army Corps of Engineers -- an activity that causes further disruptions in normal river movements.

The condition and antiquated method of operation of some of the locks and dams of the inland waterways system are a cause of great concern to the waterborne transportation industry. Those locks and dams considered to be of greatest concern are Lock and Dam 26 on the upper Mississippi River, Gallipolis Lock and Dam on the Ohio River, and those on the Monongahela River. Other facilities in immediate need of replacement or improvement include the Vermillion and Calcasieu Locks on the Gulf Intracoastal Waterway and the Industrial Canal Lock at New Orleans.

Other factors considered to be constraints to the waterborne transportation industry are the escalating volume of traffic at the smaller locks (i.e., Lock and Dam 26 on the Mississippi River at Alton, Illinois, and Gallipolis Lock and Dam on the Ohio River at Gallipolis, Ohio, where delays of three days and one day, respectively, are considered normal), and bridges spanning the inland waterways system with restrictive horizontal and vertical clearances which represent another type of navigational concern.

Planned development of an effective inland waterways system requires an in-depth analysis and comparison of the current system's capabilities and projection of growth potential in order to determine the best use of available resources. The Gulf Intracoastal Waterway is typical of those portions of the waterway system that require in-depth analysis. When this waterway was authorized in the 1920's, it was anticipated that it would handle 5 million tons of cargo per year. In the early 1940's, the waterway was handling 18 million tons per year, and Congress authorized that its depth be increased from 9 feet to 12 feet and the bottom width increased from 100 feet to 125 feet. Presently this waterway is handling in excess of 100 million tons of cargo annually and has almost reached its maximum capability. There are proponents of both the widening and deepening of this system and a thorough analysis of both suggestions should be made.

The Maritime Administration has entered into contracts for studies which should prove beneficial in these areas. One such contract deals with least-energy operation of river shipping and concerns the line-haul phase of river shipping. Methods have been derived for determining the best speeds at which to operate river towing equipment in order to minimize fuel consumption. This methodology will prescribe a best speed for each reach of a river, given the equipment used and fuel rates and costs. A second study is the "Mid-America Ports Study" which has been entered into by MARAD and 17 states. This study will provide information needed to improve the port planning and development process. It will also identify the requirements for marine terminal facilities in meeting the demands of increasing commodity flows and improving technology over the next 25 years.

The Maritime Administration was also responsible for the six-volume 1975 report entitled Primer on Inland Waterways Ports. The report's objectives were to identify restrictions on the efficient development and operation of inland waterways ports throughout the United States to determine the effects of river level fluctuations on port operations in order to recommend ways of improving port development and minimizing the effects of operational problems. The economics of inland port operations were analyzed, as were developments concerning various barge services, containerization, and foreign trade zones. Recommendations were made for improving operations in ports which are planned or under development and for increasing the cargo throughput of existing dock and cargo handling facilities.

In addition to the projects described above, the U.S. Army Corps of Engineers is conducting a comprehensive study, "The National Waterways Study," to determine the ability of the current inland waterways system to meet future transportation needs. This three-year study was authorized by Section 158 of the Water Resources Development Act of 1976 and is being carried out by the

Corps' Institute for Water Resources. The study is scheduled for completion in late 1980. The study will cover four major areas:

- The nation's existing water transportation system will be reviewed to identify major physical and operational characteristics, commodity movements, types of carriers and shippers, ports, and harbors.
- The existing waterways system's ability to meet future needs will be assessed.
- Selection and analysis of alternate changes to the waterways system will be conducted, including the assessment of national security and defense needs.
- Recommendations will be formulated and submitted to the Congress for future action.

Restrictions on the waterborne transportation industry classified as "attendant services constraints" generally include limitations of terminals and material handling equipment, ineffective aids to navigation, uncertainty of availability and quality of fleeting areas and fleeting services, and insufficient communications. Other attendant service constraints which should be mentioned are interference by pleasurecraft, the lack of ready availability of manpower to the waterborne transportation industry, and the incongruous dimensional relationship between lash barges and tank barges normally moved on the inland waterways.

Improving port facilities and cargo handling techniques would complement the advanced technology of tug barge operations and contribute to improved productivity on the inland waterways.

The inland waterways system is currently troubled by the insufficient number and nonstrategic location of tank barge cleaning and gas freeing facilities. Barges experience service delays and are often removed from a unit tow for a complete round trip. The Coast Guard formed the Waterfront Facilities Task Force in 1977 to examine all waterfront facilities including cleaning and gas freeing facilities. The task force's study is scheduled for completion in December 1979.

The Army Corps of Engineers has the legislative responsibility of maintaining the waterways of the United States for navigation and the Coast Guard has the responsibility of maintaining aids to navigation including bridges across navigable waterways. These groups, in addition to the Maritime Administration and the operators and users of the waterways system, recognize the important effects that natural and physical constraints have on the productive, efficient operation of the systems. These groups are working together to ensure that the waterways system operates with a minimum of natural and physical constraints.

INSTITUTIONAL

As is the case with other modes of transportation, the waterborne transportation industry is regulated by various local, state, and federal government agencies in the operation of its facilities and services. The principal problem with this regulation is the lack of consistency between regulations imposed upon the waterways industry by the various government agencies. For example, state-imposed environmental regulations may be more stringent than those established at the federal level. A recent example is the state of Minnesota's March 1975 suit against the Army Corps of Engineers stating that the Corps' dredge-disposal techniques were in violation of applicable state water pollution control laws.

Given the legal complexity of federal/state relations, it is difficult to chart the latitude left for state action after federal regulation of shipping. Nor is it possible to inventory state programs which could affect shipping operations. Therefore, this discussion is intended only to point out some of the jurisdictional bases under which states could regulate the domestic shipping industry. The potential impact of state regulation of waterborne transportation is greatly increased by provisions of the Outer Continental Shelf Land Act, which states that "...the civil and criminal laws of each adjacent state...are declared to be the law of the United States for that portion...of the Outer Continental Shelf...which would be within the area of the state if its boundaries were extended seaward to the Outer Margin of the Outer Continental Shelf...."

The provisions of the Federal Water Pollution Control Act (known as the Clean Water Act) state that nothing in the statute "shall be construed as preempting any state from imposing any requirement of liability with respect to the discharge of oil into any waters within such state." The Supreme Court, in Askew versus American Waterways Operators, interpreted this language to authorize a Florida statute which would impose liability for consequential damages as well as cleanup costs and raised the level of liability for cleanup costs over the amount established in the Clean Water Act. The major significance of the Court's interpretation is the possibility that other states will be able to impose yet more rigorous restraints on the shipment of oil. Other states, including Maine, Massachusetts, and California, have attempted to follow Florida's lead.

Several other federal programs authorize state action which could potentially limit the operation of tankers in the domestic trades. For example, the Clean Air Act Amendments of 1977 have a system of dual federal and state regulation. Basic air standards are to be set by the Environmental Protection Agency; however, the states are responsible for planning programs to achieve Environmental Protection Agency standards. Once state implementation plans are accepted by the Environmental Protection Agency, they may be enforced by both state and federal action. The act also states explicitly that states shall have the right to set local standards as long as they are not less rigorous than the federal requirements.

The Coastal Zone Management Act, while not establishing either a right of state action or a means of federal enforcement, is clearly intended to encourage the development of state coastal management programs. As such, the courts may well decide that Congressional policy is counter to any preemption which could limit the right of state action unless it clearly conflicts with the requirements of a federal program.

Many other federal programs which may not provide incentives for state action may nonetheless state explicitly that state action is not to be preempted by federal action. The Deepwater Port Act states that federal regulation of the construction and operation of offshore port facilities "shall not be interpreted to preempt the field of liability or to preclude any state from imposing additional requirements or liability for any discharge of oil from a deepwater port or a vessel within any safety zone."

A brief examination of the leading cases of federal preemption of state action suggests that the courts are more likely to strike down state regulations which either impede shipping movement directly or which would duplicate or frustrate a comprehensive federal program. However, a state may well be permitted to regulate some aspects of shipping in a manner which does not substantially impede the movement of commerce and which protects some aspect of local interests in property, health, or welfare which are not protected by a comprehensive federal scheme.

Clearly, the possible effects of state and local regulation of the domestic shipping industry are sufficiently important that a detailed inventory of local practices must be undertaken before adopting specific contingency plans for the transportation of oil by water in the domestic trades.

In summary, institutional constraints upon the waterborne transportation industry, including the laws, directives, and regulations of federal, state, and local governments, presently tend to restrict domestic marine commerce.

ECONOMIC

Comparative modal studies point out that the American public requires all current modes of transportation in order to receive the best service. However, potential economic restrictions on the waterways industry may soon occur in the form of mandatory energy-use reduction measures. Because the waterways industry is one of the most fuel-efficient forms of transportation, such measures would be counter-productive.

There is a significant amount of public investment in the construction and maintenance of navigable waterways; most marine equipment and port facilities are financed through the private capital market. Inflation and escalating costs are critical issues as the cost of new construction appears to be rising faster than the resultant benefits of projects. The change in emphasis of federal goals and the reduced availability and increased competition for federal funds for waterways projects also contribute to the uncertainty in financial matters. The impact of a fuel tax on the modernization requirements of the inland waterways system remains to be seen.

The identification and planned development of effective, career-oriented personnel programs require analysis of the industry's current and projected resources and needs. The correlation between available personnel, existing jobs, labor force growth trends, and projected future employment opportunities figures greatly in the development of programs to attract high caliber, well-motivated people to career positions in the waterborne transportation industry and to provide properly trained vessel operating personnel through modern training methods and adequate facilities. In addition, a need exists to foster the continued growth of the waterborne transportation industry through the recruitment and retention of efficient, highly qualified professional managers, to emphasize the need for properly trained vessel operating personnel, and to identify manpower shortages by skill and by domestic shipping area.

Unquestionably, the Great Lakes area is presently experiencing the most critical manpower shortages of the waterborne transportation industry. In a March 1979 report entitled Great Lakes Manpower Requirements: Deck and Engine Officers, Supply and Demand, 1978-1987, the Maritime Administration found that there is a current shortage of approximately 108 (or 10.5 percent) of the required 1,031 engineering officers, and deck officers fall 4 percent short of meeting current demand. By 1987, according to the report, Great Lakes shipping concerns will experience shortfalls in engineers of nearly 40 percent and of 25 percent in the case of required deck officers. In view of the manpower projections contained in the report, MARAD recommended several courses of action to ameliorate the expected shortfall, including:

- Increased enrollment and program effectiveness at Great Lakes Maritime Academy and at labor-industry training centers

- Offers of training berths aboard ship by American Flag-Great Lakes vessel operators to cadets at the U.S. Merchant Marine Academy

- Institution of enforceable contractual agreements between training institutions and students (MARAD suggested that students training at federally or industry supported schools be required to serve a specified period of time in Great Lakes service or be required to reimburse the institutions for the cost of their instruction)

- Consideration by the Coast Guard of issuing temporary officer licenses to unlicensed personnel as it did during the Vietnam conflict when officers were needed on U.S. merchant convoys.

Without a concerted labor-industry-government program addressing the current and projected shortages in Great Lakes manpower requirements, the report concludes that it is "...very possible that entire segments of the Great Lakes fleet will be prevented from sailing."

SUMMARY

The two major factors influencing the continued growth of the waterborne transportation industry are improved productivity, and the maintenance, modernization, and expansion of existing navigational facilities. Some federal, state, and local regulations, uncertainties involving capital formation and methods of financing, and manpower shortages represent major restrictions on improved productivity. The American inland waterways system is now 95 percent complete; therefore, only limited development of new waterways/river canalization is anticipated. However, continual project reevaluations and changing national priorities may impede planned and authorized necessary maintenance, modernization, and expansion of existing facilities, which are critical to improved productivity of the waterways system.

APPENDICES

Department of Energy
Washington, D.C. 20585

June 20, 1978

Dear Mr. Chandler:

The National Petroleum Council has prepared numerous studies in the past on the Nation's petroleum transportation systems. The last study on this subject was prepared over ten years ago and published on September 15, 1967.

The transportation data collected over the years by the Council has been used by the Federal Government for emergency preparedness planning purposes. The data includes information on major crude oil and petroleum product pipelines, natural gas transmission lines, inland waterway barges, tank cars and tank trucks. Detailed information is also included on the location, capacity and type of pump stations and compressor stations.

As part of the Government's overall review and update of emergency preparedness planning, current data are needed on the Nation's petroleum transportation systems. I, therefore, request the National Petroleum Council to undertake a detailed study to determine current petroleum and gas transportation capacities including natural gas transmission lines, crude oil and petroleum product pipelines, crude oil gathering lines in major producing areas, inland waterway barges, tank cars and tank trucks. With respect to transportation of oil and petroleum products, the study should cover the spatial and transportation relationships--the match ups--among refineries of varying capacities and crude oil sources.

The study should examine the industry's flexibility to meet dislocations of supply and outline the changing supply patterns of the petroleum and natural gas deliverability systems.

For the purpose of this study, I will designate the Deputy Assistant Secretary for Policy and Evaluation to represent me and to provide the necessary coordination between the Department of Energy and the National Petroleum Council.

Sincerely,

James R. Schlesinger
Secretary

Mr. Collis P. Chandler, Jr.
Chairman, National Petroleum Council
1625 K Street, N.W.
Washington, D. C. 20006

Department of Energy
Washington, D.C. 20585

June 20, 1978

Dear Mr. Chandler:

The ability of this Nation to withstand interruptions in normal oil supplies, whether by domestic dislocation or by foreign intervention, is immediately served by recourse to existing inventories of oil stocks. In addition, the United States has embarked on a Strategic Petroleum Reserve program to aid in meeting its commitments abroad and its commitments to consumers at home in case of another interruption of foreign oil supply. For industry and Government to respond appropriately to an emergency, our need for accurate information and understanding of primary petroleum inventories is greater than it has ever been.

Implicit in an understanding of petroleum inventories is the distinction between total stocks and those stocks which would be readily available for use. Such information is essential in evaluating correctly the extent of the contribution our oil stocks would be able to make in times of oil supply emergency and planning the development and use of the Strategic Petroleum Reserve.

Periodically the National Petroleum Council has conducted for the Department of the Interior a survey of the availability of petroleum inventories and storage capacity. The last such report was issued in 1974, the eighth in a series which began in 1948.

Accordingly, the National Petroleum Council is requested to prepare for the Department of Energy a new report on available petroleum inventories and storage capacity. This new report should emphasize the distinction between available stocks and those unavailable. For the purpose of this study, I will designate the Deputy Assistant Secretary for Policy and Evaluation to represent me and to provide the necessary coordination between the Department of Energy and the National Petroleum Council.

Sincerely,

James R. Schlesinger
Secretary

Mr. Collis P. Chandler, Jr.
Chairman
National Petroleum Council
1625 K Street, N.W.
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PETROLEUM RECEIVING FACILITIES: U.S. COASTAL AND INLAND WATERWAYS

The following tables are a representative listing of major petroleum receiving facilities:

- U.S. Coastal (Table 2)
- Puerto Rico and Virgin Island Coastal (Table 3)
- U. S. Inland (Table 4).

The information was obtained from the Maritime Administration, which conducts periodic surveys of the major U.S. coastal and inland waterways ports, and from the members of the Waterborne Transportation Task Group. Included in this listing are coastal facilities with 50,000 barrels or more of storage capacity; for facilities on the inland waterways system, the minimum storage capacity was set at 20,000 barrels. The surveys cover the years from mid-1974 to the third quarter of 1979 for coastal facilities and from 1977 to mid-1979 for inland facilities. It should be recognized that the surveys do not cover all the facilities in operation at the present.

The most significant trend regarding petroleum receiving facilities is the development of deepwater port facilities in the United States' coastal waters capable of handling larger tankers of crude oil, thus lowering the overall costs of imported crude oil. The Louisiana Offshore Oil Port (LOOP) project, which is scheduled for completion in 1981, is the first of several planned deepwater ports that has actually obtained the necessary permits and operating licenses to proceed. LOOP will have the capacity of discharging 1.4 million barrels of crude oil per day when operational and will handle the equivalent unloading of some 330 supertankers per year. LOOP and its associated pipeline system (LOCAP) are also projected to displace about 85 percent of the crude oil movements that are presently winding their way up the lower Mississippi River system in small tankers to discharge crude oil at terminals, refineries, and pipeline receiving facilities located between New Orleans and Baton Rouge. With the United States' growing dependence on imported crude oil and the volume of small tanker traffic in the lower Mississippi River, LOOP will be a major factor in lessening concerns over the crowded waterways in that area of the country.

TABLE 2

U.S. Coastal Petroleum Receiving Facilities

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Portland, ME	Mobil Oil Dock Fore River South Portland, ME 04106	34	220	K	830 180	D	August 23, 1974
Portland, ME	Amoco Wharf Fore River South Portland, ME 04106	30	230	K	420	D	August 23, 1974
Portland, ME	Texaco Wharf Fore River South Portland, ME 04106	40	340	K	520	D	August 23, 1974
E. Braintree, MA	Cities Service Co. 385 Quincy Ave. Braintree, MA 02184	35	700	K	1,330	D	November 1, 1978
Chelsea, MA	Cities Service Co. 324 Marginal St. Chelsea, MA 02150	22	974	K	382	D	March 1, 1979
New York, NY	Port Mobil Terminal Ft. Ellis Lane Staten Island, NY 10309	30	550	K	2,880	D	October 16, 1974
Perth Amboy, NJ	Chevron Oil Co. Terminal 1200 State St. Perth Amboy, NJ 08861	38	1,180	JK	7,200	R	April 8, 1975
Linden, NJ	Cities Service Oil Ft. Wood Ave. Linden, NJ 07036	32	1,511	K	3,500	D	November 1, 1974
Linden, NJ	Northville Industries Ft. Wood Ave. Linden, NJ 07036	35	750	K	450	D	February 1, 1979

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth[*] (Feet)	Length[†] (Feet)	Cargo[§]	Capacity[¶] (Mbbl)	Type of Facility[**]	Date[††]
Linden, NJ	Cities Service Oil Ft. Wood Ave. Linden, NJ 07036	32	1,511	K	3,400	D	October 1, 1979
Brooklyn, NY	Cities Service Oil 311 Norman Ave. Brooklyn, NY 11222	20	368	K	51	D	March 1, 1979
Pettys Island, NJ	Cities Service Oil 36th St. & Delaware River P. O. Box 171 Pennsauken, NJ 08110	35	800	K	1,200	D	March 1, 1979
Staten Island, NY	Gulf Oil - Gulfport Terminal Staten Island, NY	26	1,190	K	5,270	D	September 19, 1974
Bayonne, NJ	Exxon East 22nd St. Bayonne, NJ 07002	 35 35	546 750 700	K	6,000	D	November 6, 1974
Newark, NJ	Coastal Oil, Berth 19 Ft. Gilligan St. Newark, NJ 07105	35	690	K	740	D	September 15, 1974
Newark, NJ	Tenneco Oil 678 Doremus Ave. Newark, NJ 07105	32	670	K	1,060	D	March 14, 1975
Camden, NJ	BP Oil, Berths 1,2 Paulsboro, NJ 08066	36	1,053	J	3,500	D	July 30, 1974
Camden, NJ	Mantua Chemical Terminal Paulsboro, NJ 08066	40	850	JK	2,000	D	August 9, 1974
Camden, NJ	Cities Service Oil Wharf Pettys Island, NJ	22	750	K	1,000	D	August 10, 1974
Delaware City, DE	Getty Oil, Pier 3 Delaware City, DE 19706	40	750 45 45	K	2,100	R	July 12, 1974

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Chester, PA	BP Marcos Hook, Refinery 1,2,3 Trainer, PA	34	1,145	J	3,500 1,970	R	August 13, 1974
Chester, PA	Sunoco Wharf #1 Marcus Hook, PA 19061	32 32 32	265 500 470	JK	4,880	R	August 14, 1974
Newport News, VA	Amoco Yorktown Refinery York River Yorktown, VA 23490	40	1,000	J	1,600 3,150	R	October 10, 1974
Chesapeake, VA	Tenneco Cities Service Wharf Elizabeth River Chesapeake, VA 23324	28	208	K	350 90	D	October 9, 1974
Chesapeake, VA	Texaco Barnes Rd. Chesapeake, VA 23324	35	565	K	880	D	October 9, 1974
Hampton Roads, VA	Amoco Oil Wharf Elizabeth River Chesapeake, VA 23324	27	235	K	120 440	D	October 9, 1974
Chesapeake, VA	Gulf Oil Wharf Elizabeth River Chesapeake, VA 23324	27	1,003	K	860	D	October 9, 1974
Chesapeake, VA	Mobil Oil Tanker Wharf Elizabeth River Chesapeake, VA 23324	35 35 35	315 35 35	K	770 570	D	October 8, 1974
Norfolk, VA	Exxon Sewells Pt Terminal Pier 8201 Hampton Blvd. Norfolk, VA 23505	35 25 25	30 1,300 1,300	K	2,500	D	October 8, 1974
Morehead City, NC	State Port Terminal, Berth 1 Morehead City, NC 28557	35 35	350 80 101	K	3,000	D	November 6, 1974

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Wilmington, NC	Exxon Terminal River Rd. Wilmington, NC 28401	40	836	K	1,370	D	November 7, 1974
Wilmington, NC	Texaco Wharf River Rd. Wilmington, NC 28401	34	550	K	330 240	D	November 7, 1974
Charleston, SC	Exxon Wharf Charleston, SC 29401	38	272 42 42	K	2,900	D	November 14, 1974
Savannah, GA	Amoco Wharf Foundation Tract Savannah, GA 31408	30	580 100 100	JK	940	D	November 18, 1974
Brunswick, GA	Brunswick Port Authority Lanier Dock Brunswick, GA 31520	30	500 50	K	310	D	November 20, 1974
Miami, FL	Belcher Oil Terminal Fishers Island Miami, FL 33101	38	800	K	360	D	December 18, 1974
Port Everglades, FL	Cities Service Co. 800 S.E. 28th St. Fort Lauderdale, FL 33316	37	1,200	K	590	D	March 1, 1979
Tampa, FL	Cities Service Co. 1700 Hemlock Ave. Tampa, FL 33605	29	571	K	266	D	February 1, 1979
Tampa, FL	Texaco Inc. 519 19th St. Tampa, FL	30	282 49 49	K	520		March 11, 1975
Tampa, FL	Shell Oil Wharf Tampa, FL	34	100 30 30	K	630	D	March 11, 1975

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Tampa, FL	Gulf Oil West Wharf Tampa, FL	32 32 32	85 30 30	K	560		March 11, 1975
Pensacola, FL	Port of Pensacola, Berth 3 P. O. Box 889 Pensacola, FL	32	425	J	150	D	September 15, 1974
Mobile, AL	Cheveron Asphalt Wharf Blakley Island Mobile, AL	29	105	K	950	D	October 6, 1974
Mobile, AL	Texaco Marine Terminal Virginia St. Mobile, AL 36602	29 15 35	600 630 630	K	413	D	December 31, 1978
Pilottown, LA	Texas Pipeline Co. Pilottown, LA 70081	40	320	J	600	D	October 9, 1974
Ostrica, LA	Gulf Oil Ostrica, LA	33	340	J	970	D	October 9, 1974
Alliance, LA	Gulf Oil Tanker Dock P. O. Box 395 Belle Chasse, LA 70037	40	380	J	7,000	R	October 9, 1974
Belle Chasse, LA	Chevron Chemical Belle Chasse, LA 70037	40	110	K	165		December 31, 1978
Mereaux, LA	Murphy Oil Wharf Mereaux, LA 70075	40	757	K	560	R	October 8, 1974
Chalmette, LA	Tenneco Oil, Wharf #4 Chalmette, LA 70043	50	72	K	3,055	R	October 8, 1974
New Orleans, LA	North American Trading & Import Westwego, LA 70094	40	270	K	1,500	D	September 25, 1974
New Orleans, LA	Pacific Molasses 660 Labeauve Dr. Westwego, LA 70094	40	600	K	830	D	August 27, 1979

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
New Orleans, LA	Hess Oil & Chemical, Main Wharf Marrero, LA 70072	40	320	K	1,070	D	October 8, 1974
New Orleans, LA	Texaco P. O. Box 7 Marrero, LA 70072	35	440	K	630	D	December 31, 1978
New Orleans, LA	International Minerals and Chemicals Corp. P. O. Box 86 Harvey, LA 70058	32	680	K	530	D	August 15, 1979
New Orleans, LA	Delta Commodities P. O. Box 581 Harvey, LA 70058	44	750	K	952	D	August 20, 1979
New Orleans, LA	Gulf Oil Gretna, LA 70053	23	540	K	210	D	October 8, 1974
New Orleans, LA	International Tank Terminals 5450 River Rd. Avondale, LA 70094	50	200	K	1,000	D	September 25, 1974
New Orleans, LA	General American Transport, #1 P. O. Box 157 Good Hope, LA 70079	36	350	JK	1,300	D	August 15, 1979
New Orleans, LA	Shell Oil Norco, LA 70079	40	1,600	JK	8,000	R	September 11, 1974
New Orleans, LA	Union Carbide Corp. P. O. Box 50 Hahnville, LA 70057	45	700	JK	2,130		August 21, 1979
Baton Rouge, LA	Texaco Inc. Dock #1 P. O. Box 37 Dock #2 Convent, LA 70723	50	790 837	JK	4,075	R	September 17, 1979
Baton Rouge, LA	Allied Chemical Corp. P. O. Box 226 Geismar, LA 70734	55	1,105	K	55		September 30, 1974

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Baton Rouge, LA	Cos-Mar Plant P. O. Box 11 Carville, LA 70721	35	802	K	453		August 30, 1979
Baton Rouge, LA	Exxon Co. P. O. Box 551 Baton Rouge, LA 70821	50	2,750	JK	3,500	R	September 4, 1979
Lake Charles, LA	Continental Oil, Dock 3 P. O. Box 37 Westlake, LA 70669	38	650	JK	330	Y	September 5, 1974
Lake Charles, LA	Continental Oil, Dock 1 P. O. Box 37 Westlake, LA 70669	38	712	JK	330	Y	August 20, 1979
Lake Charles, LA	Cities Service Oil, Dock C P. O. Box 1562 Lake Charles, LA 70601	36	660	J	8,880	Y	August 20, 1979
Lake Charles, LA	Cities Service Oil, Dock D P. O. Box 1562 Lake Charles, LA 70601	36	665	J	3,540	Y	August 20, 1979
Lake Charles, LA	Cities Service Oil, Dock B P. O. Box 1562 Lake Charles, LA 70601	36	673	JK	9,450	Y	August 20, 1979
Lake Charles, LA	Clifton Ridge Terminal P. O. Box 1424 Lake Charles, LA 70601	36	825	JK	2,950	Y	August 30, 1979
Beaumont, TX	Mobil Marine Terminal P. O. Box 3311 Beaumont, TX 77704	42 30 30	1,500 100 100	JK	860 1,920 220	R	September 15, 1974
Beaumont, TX	Mobil Chemical Dock P. O. Box 3868 Beaumont, TX 77704	27	147	JK	130 60 50	R	August 20, 1979

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Beaumont, TX	Texas Refining Co. P. O. Box 10 Beaumont, TX 77705	42	90	JK	50 80	D	August 20, 1979
Nederland, TX	Sun Oil P. O. Box 758 Nederland, TX 77627	40	150	JK	3,400 230	D	August 5, 1974
Port Neches, TX	Union Texas Petroleum Port Neches, TX 77651	25	50	JK	30 55 80	D	September 25, 1974
Port Neches, TX	Texaco P. O. Box 787 Port Neches, TX 77651	38 38	652 514	JK	2,503	Y	August 13, 1974
Port Arthur, TX	Amdel Pipeline (Amer. Petrofina) Box 818 Groves, TX 77650	40	512 222	JK	2,300	Y	August 23, 1979
Houston, TX	Exxon Pier #1 P. O. Box 3950 Baytown, TX 77520	40	770 40	KJ	9,999	Y	December 15, 1974
Houston, TX	Amerada Hess, Ship Dock 2 Houston, TX	38	100 21	K	4,500	R	December 15, 1974
Houston, TX	Texaco, East & West Docks P. O. Box 52332 Houston, TX 77052	30	250 685 526	K	1,330	D	December 15, 1974
Houston, TX	Gatx-Galena Park Terminal Dock P. O. Box 486 Galena Park, TX 77547	39	125 25	K	3,240	D	December 15, 1974
Houston, TX	Robertson Terminals Galena Park, TX 77547	31	220	K	820	D	December 15, 1974
Houston, TX	Manchester Wharf 3 East Loop Fwy. Bridge Houston, TX	28	500 20	K	520 80 240	D D D	December 15, 1974

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Houston, TX	Charter International Oil Dock P. O. Box 5008 Houston, TX 77012	30	152 20	JK	2,390	Y	August 30, 1979
Houston, TX	Port of Houston, Tanker Dock Clinton Island Houston, TX	28	105 32	JK	350	Y	December 15, 1974
Houston, TX	Atlantic Richfield, Dock 4 P. O. Box 2451 Houston, TX 77001	32	56 31 25	JK	6,450	R	December 15, 1974
Port of Houston	Crown Central Petroleum Wharf Cotton Patch Bayou Houston, TX	39	150 12	JK	4,690	Y	August 30, 1979
Houston, TX	Gatx Pasadena Terminal Cotton Patch Bayou Houston, TX	33	100 21	K	7,000	D	August 30, 1979
Houston, TX	Tenneco Wharf Boggy Bayou Houston, TX	29	90 25	K	220 170 20	R R R	December 15, 1974
Houston, TX	Shell Oil, Dock 4 Boggy Bayou Houston, TX	40	243 28	JK	4,000	Y	December 15, 1974
Houston, TX	Shell Oil, Dock 3 Boggy Bayou Houston, TX	40	243 44	JK	4,000	Y	December 15, 1974
Houston, TX	Shell Oil, Dock 2 Houston, TX	40	238 44	JK	4,000	Y	December 15, 1974
Houston, TX	Shell Oil, Dock 1 Houston, TX	40	243 28	JK	4,000	Y	December 15, 1974
Houston, TX	Intercontinental Terminal Wharf RF Houston, TX	 40	170 720	K	360	D	December 15, 1974

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Houston, TX	Paktank Terminals, Wharf		50	K	2,000	D	December 15, 1974
	Deer Park, TX	42	200				
Houston, TX	Celanese Terminal	36	132	K	40	D	December 15, 1974
	Bayport Turn. Basin				160	D	
	Houston, TX						
Texas City, TX	Oil Dock #1	36	150	JK	2,310	R	August 8, 1974
	Texas City, TX						
Texas City, TX	Oil Dock #2	36	320	JK	2,510	R	August 9, 1974
	Texas City, TX						
Texas City, TX	Oil Dock #4	36	284	JK	1,910	R	August 10, 1974
	Texas City, TX						
Texas City, TX	Amoco Tanker Dock #1	40	320	JK	1,500	R	August 13, 1974
	Texas City, TX						
Texas City, TX	Amoco Tanker Dock #2	40	320	JK	1,500	R	August 14, 1974
	Texas City, TX						
Brazos River Harbor, TX	Phillips Freeport Terminal #2	34	160	JK	100	Y	September 15, 1974
	Quintana Rd.				140		
	Freeport, TX				60		
Corpus Christi, TX	Reynolds Bauxite Pier-North	40	615	JK	120	D	October 3, 1974
	Laquinta Turn. Basin	40			10	D	
	Corpus Christi, TX						
Corpus Christi, TX	Reynolds Alumina Dock	38	400	K	20	D	October 3, 1974
	E. Laquinta Basin				100		
	Corpus Christi, TX						
Corpus Christi, TX	Oil Dock #1	33	216	JK	620	D	October 3, 1974
	Turning Basin North				80	D	
	Corpus Christi, TX				1,260	Y	
Corpus Christi, TX	Oil Dock #8	34	87	JK	4,500	Y	October 3, 1974
	Viola Turning Basin						
	Corpus Christi, TX						

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Corpus Christi, TX	Corn Producers Dock Corpus Christi, TX	40	20	K	14 10	R	October 3, 1974
Corpus Christi, TX	Oil Dock #7 Tule Lake Channel Corpus Christi, TX	41	143	JK	3,900 1,550	Y D	October 3, 1974
Corpus Christi, TX	Oil Dock #4 Tule Lake Channel Corpus Christi, TX	38	143	JK	3,900 1,550	Y D	October 3, 1974
Corpus Christi, TX	Champlin Oil Dock Industrial Canal Corpus Christi, TX	40	118	JK	3,997	R	October 3, 1974
Corpus Christi, TX	Southern Refining, Dock 2 Industrial Canal Corpus Christi, TX	41	121	JK	5,940 30 109	Y D D	October 3, 1974
Corpus Christi, TX	Mobil Oil Dock Turning Basin Corpus Christi, TX	34	73	JK	1,150	D	October 3, 1974
Corpus Christi, TX	American Petroleum Oil Dock Harbor Island Corpus Christi, TX	53	260	JK	890	D	October 3, 1974
Corpus Christi, TX	Exxon Oil, Dock 1 Harbor Island Corpus Christi, TX	40	300	J	1,510	D	October 3, 1974
Corpus Christi, TX	Sun Oil, Oil Dock Corpus Christi, TX	40	144	JK	860	D	October 3, 1974
Ogdensburg, NY	The Augsbury Corp., Plant 1 Ogdensburg, NY	15	1,500	K	471	D	July 6, 1978
Ogdensburg, NY	The Augsbury Corp, Plant 2 Ogdensburg, NY		100	K	295	D	July 6, 1978

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Oswego, NY	Port of Oswego - West Side Term. Oswego, NY	21 19	150 1,000	K	 380	 D	September 15, 1974
Sackets Harbor, NY	Augsbury Oil Co. Ambrose St. Sackets Harbor, NY			K	589	D	July 6, 1978
Toledo, OH	Sun Oil Hocking Valley Dock 1833 Front St. Toledo, OH 43605	15	920	K	250	Y	July 10, 1978
Toledo, OH	Gulf Oil Corp. 2935 Front St. Toledo, OH 43650	25		K	1,683	X	July 30, 1978
Toledo, OH	Ashland Petroleum Company 3147 Jessie St. Toledo, OH 43605	20	83	K	375	D	July 29, 1978
Cleveland, OH	Whiskey Island Cleveland, OH 44101	20	30	K	382	D	August 8, 1978
Cleveland, OH	Gulf Oil Company 250 E. Jefferson Cleveland, OH 44113	22	100	K	396	D	July 11, 1978
Cleveland, OH	Marine Fueling 2950 Independence Rd. Cleveland, OH 44115	22 22	520 400	K	111	D	October 4, 1978
Tonawanda, NY	Sunmark Industries 3755 River Rd. Tonawanda, NY 14150	 12	 250	K	285	Z	June 10, 1978
Buffalo, NY	Mobil Buffalo Refinery 635 Elk St. Buffalo, NY 14240	18	1,470	K	1,370	Y	July 5, 1978
Detroit, MI	Shell Oil Detroit Terminal 700 S. Deacon St. Detroit, MI	19	490	K	150 70 110	D D D	September 15, 1974

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Detroit, MI	Ford Motor - Coal Tar Dock Detroit, MI	27	1,300	K	550		September 15, 1974
Chicago, IL	Bulk Terminals 12200 S. Stony Island Chicago, IL 60633	27	600	K	725	D D	August 4, 1978
Milwaukee, WI	Marathon-WI Petroleum Term. Corp. 1980 S. Harbor Dr. Milwaukee, WI 53207			K	175	D	May 10, 1978
Sheboygan, WI	Reiss Oil Terminal Corporation 1011 S. 8th St. S Bank Sheboygan, WI 53081	20	1,200	K	392	D	April 19, 1978
Two Rivers, WI	US Oil Company Inc. Box 145 2212 School Street Two Rivers, WI 54241	18	410	K	211	D	April 25, 1978
Superior, WI	Mprine Fueling Div., Reiss Oil Hill & Winter St. Superior, WI 54880	22	980	K	101 70	D D	April 25, 1978
Superior, WI	Murphy Oil Corp. Superior Refinery E. End Station, Stinson Ave. Superior, WI 54880	21	550	JK	98	Y	April 26, 1978
Long Beach, CA	Marine Terminal 2, Berth 76-80 1300 W. 8th St. Long Beach, CA	37 37 42	300 300 300	K	2,500	R	September 5, 1974
Long Beach, CA	Berths 84 & 87 Northside Channel 2 Long Beach, CA	52	1,970	JK	250	D	September 15, 1974
Los Angeles, CA	Southwestern Term., Berth 240B 799 S. Seaside Ave. Terminal Island, CA 90731	18	230	JK	120	Y	September 4, 1974

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Los Angeles, CA	Berths 238-240A&B Los Angeles, CA	28	909	JK	1,200	Y	September 15, 1979
Los Angeles, CA	Berth 237 799 S. Seaside Ave. Terminal Island, CA 90731	33	233 36	JK	20 1,170	Y	September 4, 1974
Los Angeles, CA	Berth 216-217 Los Angeles, CA	35	897	JK	100	D	September 15, 1974
Los Angeles, CA	Berth 215 Los Angeles, CA	35	321	JK	270	Y	September 15, 1974
Los Angeles, CA	Berth 171-173 Los Angeles, CA	35	1,412	JK	1,000	Y	September 15, 1974
Los Angeles, CA	Mormon Island Pier 167-169 Los Angeles, CA	35	1,249	JK	670	Y	September 15, 1974
Los Angeles, CA	Berth 163-164 Los Angeles, CA	35	892	JK	180 410 400	Y Y Y	September 15, 1974
Los Angeles, CA	Berth 148-151 Los Angeles, CA	35	1,344	JK	810	Y	September 15, 1974
Los Angeles, CA	Berth 120 Los Angeles, CA	35	401	K	2,020	Y	September 15, 1974
Los Angeles, CA	Berth 118-119 Los Angeles, CA	35	821	K	550	Y	September 15, 1974
Los Angeles, CA	Berth 97-102 Los Angeles, CA	300	1,790	K	800	Y	September 15, 1974
Los Angeles, CA	Berth 45-47 Los Angeles, CA	51	898	JK	2,470	Y	September 15, 1974
Los Angeles, CA	Naval Supply Center Berth 37-40 Port of Los Angeles Los Angeles, CA	35	1,830	JK	50	D	August 23, 1974

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
El Segundo, CA	Berth #2 El Segundo, CA	50		JK	2,000	Y	October 15, 1974
El Segundo, CA	Berth #1 El Segundo, CA	38		K	2,000	R	October 15, 1974
El Segundo, CA	Berth #3 El Segundo, CA	63		JK	2,000	Y	October 15, 1974
El Segundo, CA	Standard Oil Berth #4 El Segundo, CA	65		JK	2,000	R	October 15, 1974
Estero Bay, CA	Morro Creek Submarine Terminal Estero Bay, CA	55		K	770	D	August 29, 1974
Pittsburg, CA	Pittsburg Power Fuel Oil Dock 696 W. 10th St. Pittsburg, CA 94565	35	700	K	6,650	D	September 15, 1974
Moss Landing, CA	Moss Landing Power Plant P. O. Box 27 Moss Landing, CA 95039	55		K	6,000	D	August 29, 1974
Richmond, CA	Terminal #4 Western Dr. Richmond, CA	35	1,061 139 100	K	720 200 80	D D D	December 1, 1975
Richmond, CA	Terminal #1 South Garrad Blvd. Richmond, CA 94801	35	557	K	300	D	December 1, 1975
Kawaihae, HA	Overseas Terminal Kawaihae, HA	35	605	K	 46 53	D D D	July 15, 1974
Astoria, OR	Port of Astoria, Pier 2 Foot of Hamburg St. Astoria, OR 97103	138 38 38	450 1,370 1,330	K	102	P	December 8, 1978

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Astoria, OR	Standard Oil Co. Wharf Foot of Fifth St. Astoria, OR 97103	40 30	200 180	K	56	D	December 6, 1978
Longview, WA	Berths 1,2,3 Longview, WA	40	1,450	JK	92 6	D D	December 15, 1974
St. Helens, OR	Reichhold Chemicals Pier N. Columbia R Hwy. Columbia City, OR	16	30 320	K	70	D	December 6, 1974
Portland, OR	Gatx Tank Storage Terminals 11400 NW St. Helens Rd. Portland, OR 97231	32	400	JK	490	D	December 3, 1974
Portland, OR	Arco Wharf Portland, OR	35	480	K	580	D	January 2, 1979
Portland, OR	Mobil Oil Dock 9420 NW St. Helens Rd. Portland, OR 97231	30	570	K	675	D	January 11, 1979
Portland, OR	Northwest Natural Gas Mooring St. Helens Rd. Portland, OR	26	20	K	135	D	January 19, 1979
Portland, OR	Shell Oil Pier 5880 NW St. Helens Rd. Portland, OR 97210	37 37	350 650	JK	4,500	D D	January 2, 1979
Portland, OR	Standard Oil Dock Portland, OR	36 36 36	 656 656	JK	1,400	D	December 28, 1978
Portland, OR	Union Oil Pier NW Front Ave. Portland, OR	 36 25	40 927 577	JK	760	D	December 28, 1978
Portland, OR	McCall Marine Terminal Wharf NW Front Ave. 5480 Portland, OR	37	150	K	850	D	January 22, 1979

TABLE 2 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Portland, OR	Texaco Oil Dock	31	400	K	465	D	January 22, 1979
	3800 NW St. Helens Rd.		40				
	Portland, OR 97210		40				
Portland, OR	Time Oil Wharf	40	80	K	670	D	January 11, 1979
	12005 W. Burgard St.		24				
	Portland, OR 97203		24				
Grays Harbor, WA	Terminal 1			K	180		October 15, 1975
	Foot of 1st St.						
	Grays Harbor, WA						
Ferndale, WA	Mobil Oil Wharf		86	JK	970	R	August 15, 1974
	Ferndale, WA	42	756		520	R	
		38	700				
Ferndale, WA	Atlantic Richfield Mooring Budy	65	109	K	3,900	R	August 15, 1974
	Jackson Road Ext.		70				
	Ferndale, WA						
Sitka, AK	Conway Dock	30	160	K	27	D	September 1, 1974
	Sitka, AK						
Juneau, AK	Union Oil Wharf	30	370	K	119	D	October 15, 1974
	Juneau, AK 99801						
Anchorage, AK	Petroleum Terminal	35	612	K	3,240	D	September 1, 1974
	Anchorage, AK						
Nikiski, AK	Standard Oil Pier	40	1,295	JK	1,530	Y	October 1, 1974
	Nikiski, AK						
Drift River, AK	Cook Inlet Pipeline	65	780	J	1,890	D	July 15, 1974
	Drift River, AK						

*Depth alongside expressed in feet.
†Wharf or pier length expressed in feet.
§The letter "K" signifies refined petroleum products and the letter "J" signifies crude oil.
¶The storage capacity expressed in thousands of barrels (Mbbl). A maximum of three storage areas is shown for each facility.
**The type of facility described, as follows: R - Refinery, P - Plant, D - Distribution Terminal, A - All, X - Refinery and Plant, Y - Refinery and Distribution Terminal, Z - Plant and Distribution Terminal.
††Date of latest survey or update.

TABLE 3

Puerto Rico and Virgin Island Coastal Petroleum Receiving Facilities

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Guayanilla, P.R.	Corco Guayanilla, P.R.	38	680 680 365	JK	-	A	December 31, 1978
Guayama, P.R.	Phillips Petroleum Guayama, P.R.	36	950 650	JK	-	A	December 31, 1978
Lime Tree Bay, V.I.	Hess Oil St. Croix, V.I.	42-32	1,300 900 650	JK	-	A	December 31, 1978
San Juan, P.R.	Carab Ref. San Juan, P.R.	35	700	JK	-	A	December 31, 1978
Yabucoa, P.R.	Sun Oil Yabucoa, P.R.	40	1,000	JK	-	A	December 31, 1978

*Depth alongside expressed in feet.
†Wharf or pier length expressed in feet.
§The letter "K" signifies refined petroleum products and the letter "J" signifies crude oil.
¶The storage capacity expressed in thousands of barrels (Mbbl). A maximum of three storage areas is shown for each facility.
**The type of facility described, as follows: R - Refinery, P - Plant, D - Distribution Terminal, A - All, X - Refinery and Plant, Y - Refinery and Distribution Terminal, Z - Plant and Distribution Terminal.
††Date of latest survey or update.

TABLE 4

U.S. Inland Petroleum Receiving Facilities

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Vicksburg, MS	Vicksburg Terminal Co. Inc. 4912 Warrenton Rd. Vicksburg, MS 39180	12	300	JK	164	D	October 28, 1977
Vicksburg, MS	Ergon Inc. P. O. Box 1066 Vicksburg, MS 39180	15	300	J	410	D	February 7, 1977
Vicksburg, MS	Billup's Western Petroleum P. O. Box 467 Vicksburg, MS 39180	15	250	J	70	Z	February 4, 1977
Greenville, MS	Mississippi Power and Light Company P. O. Box 1496 Greenville, MS 38701	8	150	K	1,971		October 17, 1977
Greenville, MS	Delta Terminal Inc. P. O. Box 270 Indianola, MS 38751	15	350	K	160	P	October 17, 1977
Greenville, MS	Ergon Inc. Drawer 619 Greenville, MS 38701	15	400	K	190	P	October 17, 1977
Greenville, MS	Greenville Republic Terminal IN 310 Walthall Greenville, MS 38701			K	265	D	October 17, 1977
Greenville, MS	Sun Oil Company Terminal 200 Short Clay St. Greenville, MS 38701		200	K	135	D	October 17, 1977
Greenville, MS	Texaco Inc. 560 Lewys Lane Greenville, MS 38701			K	47		October 17, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Arkansas City, AR	Arkansas City Terminal P. O. Box 247 Arkansas City, AR 71630	9	450	KJ	765	D	March 1, 1977
Helena, AR	Helena Terminal P. O. Box 218 Helena, AR 72342	40	1,250	K	776	D	March 1, 1977
Memphis, TN	Lion Oil Co. P. O. Box 13248 Memphis, TN 38113	9	43	K	125	D	January 18, 1977
Memphis, TN	Termco P. O. Box 3024 Memphis, TN 38103	6	30	K	117	D	February 2, 1976
Memphis, TN	Exxon Co. USA P. O. Box 2199 Memphis, TN 38101	30 30	42 24	K	477	D	January 19, 1977
Memphis, TN	Amoco Oil Co. 1979 Channel Ave. Memphis, TN 38113	9	10	K	130	D	January 25, 1977
Memphis, TN	Thomas Allen Steam Plant P. O. Box 9395 Memphis, TN 38109	9	75	K	196	P	February 2, 1977
Memphis, TN	Gulf Refining & Marketing Co. P. O. Box 9336 Memphis, TN 38109	8	75	K	196	D	January 25, 1977
Memphis, TN	Delta Refining Co. P. O. Box 9097 Memphis, TN 38109	9 9	240 240	KJ	879	A	January 20, 1977
Memphis, TN	Shell Oil Company P. O. Box 770 Memphis, TN 38101	12	12	K	134	D	February 3, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Memphis, TN	Union 76 Oil Co. P. O. Box 137 Memphis, TN 38101	12	12 4	K	125	D	January 20, 1977
Memphis, TN	Texaco Inc. 1237 Riverside Dr. Memphis, TN 38101	12	12	K	36	Y	February 3, 1977
Memphis, TN	Union Texas Petroleum Co. P. O. Box 13283 Memphis, TN 38113	9	20	JK	24 40 85	D D D	January 25, 1977
Memphis, TN	Ergon, Inc. P. O. Box 13364 Memphis, TN 38113	8	10	K	213 106	D D	January 26, 1977
Memphis, TN	Trumbull Asphalt Co. P. O. Box 7175 N. Station Memphis, TN 38107	8	12	J	61 10	A	February 2, 1977
Memphis, TN	Lucy Woodstock Terminal 2455 Second St. Memphis, TN 38126	9	450	K	170		March 18, 1977
Birds Point, MO	Illinois Waterway Terminal Birds Point, MO 63834			JK	200	D	June 3, 1977
St. Louis, MO	W. G. Krummrich Plant Rte. 3 Savget, IL 62201	20	150	K	43	Z	December 1, 1976
Granite City, IL	Petroleum Fuel and Terminal Co. Foot of Rock Rd. Granite City, IL 62040			K	585	Z	February 2, 1977
Granite City, IL	Apex Oil Co. 2801 Rock Rd. Granite City, IL 62040	9		K	25	D	July 1, 1975

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
St. Louis, MO	Apex Oil Company Mound Street St. Louis, MO			JK	590 385 200	Z	August 29, 1977
St. Louis, MO	Mobil Oil Corp. 125 Potomac St. St. Louis, MO 63118			K	53 1,500		August 27, 1975
St. Louis, MO	Martin Oil Co. 3536 S. First St. St. Louis, MO 63118			K	215	D	August 26, 1975
St. Louis, MO	J. D. Streett & Co. Inc. 3800 S. First St. St. Louis, MO 63118	9		K	485	D	August 18, 1976
St. Louis, MO	Texaco Inc. 4070 S. First St. St. Louis, MO 63118			JK	417		August 29, 1977
Wood River, IL	Marathon Pipe Line Co. Dock P. O. Box 261 Wood River, IL 62095	18	230	JK	1,200	P	November 23, 1976
Wood River, IL	Shell Oil Co. Box 262 Wood River, IL 62095	8	2,500	K	3,000	X	December 8, 1976
Palmyra, MO	American Cyanamid Company Palmyra, MO 63461			J	25 71	Z	June 13, 1977
La Grange, MO	Triangle Refineries Inc. P. O. Box 146 La Grange, MO 63401			JK	190	Y	June 2, 1977
Fort Madison, IA	Firstmiss Inc. P. O. Box 328 Fort Madison, IA 52627	7	2,000	K	5,760	P	February 14, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Burlington, IA	Yetter Oil Company 911 Osborne St. Burlington, IA 52601	15	200	K	119	D	February 14, 1977
Buffalo, IA	American Oil Co. Buffalo, IA	9	40	K	3,800	D	February 14, 1977
Bettendorf, IA	Shell Oil Company Marine Terminal Bettendorf, IA 52722	6	75	K	3,390	Z	March 15, 1977
Bettendorf, IA	Mobil Oil Company 2925 Gilbert St. Bettendorf, IA 52722	8	400	K	3,690	D	March 15, 1977
Bettendorf, IA	Amoco Oil Company S. 31st St. Bettendorf, IA 52722	7	38	K	2,483	Z	February 14, 1977
Bettendorf, IA	Phillips Petroleum Company P. O. Box M - 139 33rd S. Bettendorf, IA 52722	10	20	K	3,750	D	February 14, 1977
Bettendorf, IA	Texaco Oil Company 4100 Elm St. Bettendorf, IA 52722	9	30	K	1,490	D	February 14, 1977
Bettendorf, IA	Union Oil Company South Bellingham St. Bettendorf, IA 52722		25	K	1,600	D	February 14, 1977
Clinton, IA	Clinton Corn Processing P. O. Box 340 Clinton, IA	9	13	K	2,181	P	March 15, 1977
Dubuque, IA	Sinclair Marketing Inc. 200 Terminal St. Dubuque, IA 52001	7	80	K	3,626	D	March 15, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Dubuque, IA	Dubuque Oil Company P. O. Box 921 Dubuque, IA 52001	9	400	K	2,800	D	February 14, 1977
Winona, MN	Shell Oil Co. Winona, MN 55987	8	240	K	2,894	D	March 11, 1977
Hastings, MN	Koch Refining Co. Hastings, MN 55033	9	25	JK	2,160	Y	March 16, 1977
Pine Bend, MN	C. F. Industries Inc. 13040 Pine Bend Trail Rosemount, MN 55068	9 9	34 50	K	10 10	D D	June 17, 1977
Pine Bend, MN	Koch Refining Co. Pine Bend Rosemount, MN 55068	9	30	JK	4,400	R	March 17, 1977
St. Paul Park, MN	Northwestern Refining Co. P. O. Drawer 9 St. Paul Park, MN 55071	9	120	JK	3,500	A	March 24, 1977
St. Paul, MN	Barton Enterprises 1301 Red Rock Rd. St. Paul, MN 55101	10	200	K	507		October 5, 1977
Newport, MN	Erickson Petroleum Corporation Newport, MN 55055	8	108	K	3,910	D	April 20, 1977
St. Paul, MN	Chevron USA Inc. 2209 Childs Rd. St. Paul, MN 55106	8	50	K	700	Z	March 21, 1977
St. Paul, MN	Industrial Molasses St. Paul, MN 55106	9	63	K	1,902	D	March 22, 1977
St. Paul, MN	Union Oil Co. 747 Shephard Rd. St. Paul, MN 55102	9	50	K	1,420	D	March 31, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
St. Paul, MN	Clark Oil Co. 506 Randolph St. Paul, MN 55102	10	100	K	2,290	Z	April 15, 1977
St. Paul, MN	Shell Oil Co. 778 Otto Ave. St. Paul, MN 55102	9	45	K	9,000	Z	April 13, 1977
St. Paul, MN	Mobil Oil Co. P. O. Box 3635 St. Paul, MN 55165	12	300	K	3,000 4,120	D D	March 18, 1977
St. Paul, MN	Texaco Inc. 1700 Stewart Ave. St. Paul, MN 55116	9	100	K	16 9,020	Z Z	April 11, 1977
St. Paul, MN	American Mineral Spirits Co. 40 E. Water St. St. Paul, MN 55107	9	100	K	910	D	April 12, 1977
St. Paul, MN	Koch Fuels 499 Kentucky St. St. Paul, MN	9	30	K	930	D	April 18, 1977
Minneapolis, MN	Trumbull Asphalt Minneapolis, MN	9	50	K	140	P	March 23, 1977
Minneapolis, MN	Koch Refining Co. Minneapolis, MN 55411	9	400	K	3,460	P	March 16, 1977
La Crosse, WI	Mobil Oil Corp. 35 Copeland Ave. La Crosse, WI 54601	11	400	K	383	D	February 3, 1977
La Crosse, WI	Midwest Industrial Fuel, Inc. 615 Sumner St., Box 637 La Crosse, WI 54601	9	850	K	247	D	March 10, 1977
La Crosse, WI	French Island Plant 122 Fifth Ave. N. La Crosse, WI 54601	8	48	K	150	P	January 21, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Kipling, MI	Cities Service Co. P. O. Box 149 Gladstone, MI 49837	18	600	K	227	D	March 1, 1979
Cairo, IL	Martin Oil Co. Inc. P. O. Box 93 Cairo, IL 62914			K	120	D	February 7, 1977
Paducah, KY	Texaco Inc. 725 N. Fifth St. Paducah, KY 42001			K	67		March 7, 1978
Henderson, KY	Home Oil Terminal Co. 2633 Sunset Lane Henderson, KY 42420			K	135		August 23, 1977
Owensboro, KY	Owensboro Terminal 1817 Hardinsburgh Rd. Owensboro, KY 42301			K	118		November 11, 1977
Owensboro, KY	Texaco U.S. Highway 60 E. Owensboro, KY 42301			K	1,379		March 7, 1978
Owensboro, KY	T/A River Terminal Co. P. O. Box 685 Owensboro, KY 42301			K	112		November 10, 1977
Brandenburg, KY	Olin Corporation P. O. Box 547 Brandenburg, KY 40108			K	48		September 14, 1977
Louisville, KY	Exxon Asphalt Terminal 8600 Cane Run Rd. Louisville, KY 40258			K	190		November 14, 1977
Louisville, KY	Triangle Refineries, Inc. 4724 Camp Ground Rd. Louisville, KY 40216			K	255		August 24, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Louisville, KY	American Synthetic Rubber Corp. 4500 Camp Ground Rd. Louisville, KY 40218			K	30 18		August 26, 1977
Louisville, KY	Texaco 4510 Bells Lane Louisville, KY 40211			K	98		March 7, 1978
Louisville, KY	Louisville Asphalt Terminal 1115-1117 River Rd. Louisville, KY 40206			K	100		September 13, 1977
Louisville, KY	Louisville Terminal Louisville, KY 40211			K	643		November 11, 1977
Louisville, KY	Gulf Oil Company-US South Western Parkway Louisville, KY 40211			K	167		August 24, 1977
Louisville, KY	Louisville Terminal 161 North Shelby St. Louisville, KY 40206			K	267		December 7, 1977
Louisville, KY	Louisville Shell Oil Co. 1501 Fulton St. Louisville, KY 40206			K	250		November 2, 1978
Carrollton, KY	Carrollton Plant Facility P. O. Box 310 Carrollton, KY 41008			K	24		August 29, 1977
Bromley, KY	Covington Terminal Rte. 8 Bromley, KY 41015			K	190		November 11, 1977
Ludlow, KY	Bromley Terminal River Rd. St., RR 8 Ludlow, KY 41016			K	419		September 1, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Covington, KY	Covington Terminal, Ashland Pet. 30th and James St. Covington, KY 41015			K	250		September 14, 1977
Cincinnati, OH	Queen City Terminal Inc. 3801 Kellogg Ave. Cincinnati, OH 45226	26	300	K	450	D	July 27, 1977
Cincinnati, OH	Rookwood Oil 1542 Eastern Ave. Cincinnati, OH 45202	12	50	K	100	D	June 15, 1977
Cincinnati, OH	Union 76 Division 3117 Southside Ave. Cincinnati, OH 45204	10	120	K	120	Z	June 10, 1977
Cincinnati, OH	Shell Oil Co. 5150 River Rd. Cincinnati, OH 45233		250	K	275	D	November 16, 1977
Cincinnati, OH	Tresler Oil Co. 4015 River Rd. Cincinnati, OH 45204	15	195	K	750	D	May 27, 1977
Cincinnati, OH	Defense Fuel Support Point 4820 River Rd. Cincinnati, OH 45233	15	100	K	500	D	June 24, 1977
Cincinnati, OH	Texaco Inc. 4201 River Rd. Cincinnati, OH 45204	27	400	K	216	D	June 1, 1977
North Bend, OH	Coal Oil Equipment Unloading Platform Miami Fort Power Station North Bend, OH 45052		550	JK	200	D	June 17, 1977
Cincinnati, OH	Queen City Terminals Inc. 3801 Kellogg Ave. Cincinnati, OH 45226	23	600	K	450	A	June 3, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Sciotaville, OH	Standard Oil Co. Gallia Pike Portsmouth, OH	12	150	K	148	C	June 17, 1977
New Boston, OH	Empire-Detroit Steel Division Cyclop Rhodes Ave. New Boston, OH 45662	10		K	24 98		June 9, 1977
Wheelersburg, OH	Gulf Oil Corp. P. O. Box 161 Wheelersburg, OH 45694	12	200	K	51	D	June 15, 1977
Wurtland, KY	E. I. du Pont de Nemours Inc. P. O. Box 518 Wurtland, KY 41144			K	33		October 10, 1977
Ironton, OH	Texaco Inc. 2914 S. Third St. Ironton, OH 45638		12	K	92	D	December 13, 1977
Ironton, OH	Rich Terminal Co. 524 S. Front St. Ironton, OH 45638	9		K	45	D	June 2, 1977
South Point, OH	Allied Chemical Corp. Rte. 1, Boy A South Point, OH 45680	7	169	K	124	P	June 17, 1979
Morgans Landing, WV	John E. Amos Plant Rte. 35 St. Albans, WV 25177	18	15	K	199	P	December 12, 1978
St. Albans, WV	Mobil Oil Corporation Amandaville R PO 231 St. Albans, WV 25177				73		August 12, 1979
Institute, WV	Union Carbide Corp. P. O. Box 2831 Charleston, WV 25330			K	400	Z	August 15, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Charleston, WV	Gulf Oil Company US 215 26th St. Charleston, WV 25312	3	40	K	77	D	August 11, 1977
Charleston, WV	Union Carbide Corp. P. O. Box 8004 Charleston, WV 25303			K	400		August 15, 1977
Coalburg, WV	Union Oil Company of California P. O. Box 188 Cabin Creek, WV 25035	9	392	K	283		August 1, 1977
Hughes Creek, WV	Texaco Inc. P. O. Box 1079 Montgomery, WV 25136	9	40	K	82	D	December 12, 1977
Pt. Pleasant, WV	Goodyear Barge Dock P. O. Box 9 Point Pleasant, WV 25550			K	40	P	September 9, 1977
Cheshire, OH	Ohio Electric Co. P. O. Box 271 Cheshire, OH 45620	9	3,780	K	143		June 7, 1977
Middleport, OH	Texaco Inc. P. O. Box 307 Middleport, OH 45760			K	59	D	December 5, 1977
Constitution, OH	Chevron General Delivery Constitution, OH 45722		165	K	75		September 26, 1977
Marietta, OH	Standard Oil Co. Rte. 7 Marietta, OH 45750	12	380	K	73	D	June 17, 1977
Marietta, OH	Gulf Oil Corp. Moore's Junction Box 266 Marietta, OH 45750	15	100	K	70	D	June 22, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Marietta, OH	Ashland Petroleum Company Hwy. 7, Moore's Junction Marietta, OH 45750	9	70	K	72	D	August 22, 1977
Marietta, OH	Mobil Oil Corp. P. O. Box 389, Mile Run Marietta, OH 45750	15	400	K	65	D	May 31, 1977
Waverly, WV	Cabot Corporation P. O. Box 325 Waverly, WV 26184	10		K	110	P	September 8, 1977
Willow Island, WV	American Cyanamid Company Willow Island, WV 26190			K	32	P	August 1, 1977
St. Marys, WV	Quaker State Oil Refining Corp. 201 Barkwill St. St. Marys, WV 26170	8	151	KJ	400	A	September 21, 1977
Grandview, OH	Tri State Petroleum Corporation Rte. 7 S. New Matamoras, OH 45767		1,200	K	65	R	June 23, 1977
Sistersville, WV	Union Carbide-Chemicals/Plastic P. O. Box 180 Sistersville, WV 26175	16		KJ	47	P	September 9, 1977
Pittsburgh, PA	Jones & Laughlin Steel Corp. 2901 E. Carson St. Pittsburgh, PA 15203	13	100	JK	153	Z	April 28, 1977
Pittsburgh, PA	Jones & Laughlin Steel Corp. 4600 Second Ave. Pittsburgh, PA 15207	10 10	550	K	95 10	A	April 13, 1979
Pittsburgh, PA	USS Duquesne Plant 1 Library Place Duquesne, PA 15110	9	500	K	191	D	March 14, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth[*] (Feet)	Length[†] (Feet)	Cargo[§]	Capacity[¶] (Mbbl)	Type of Facility[**]	Date[††]
Pittsburgh, PA	The Boswell Oil Co. 702 Washington Ave. Dravosburg, PA 15234	9	800	K	200	D	February 11, 1979
West Elizabeth, PA	Hercules Inc. Rte. 837 at Madison West Elizabeth, PA 15088	9	27	JK	150	Z	January 21, 1977
Monessen, PA	Wheeling Pittsburgh Steel Corp. Twelfth St. Monessen, PA 15062	11	40	J	40	P	March 16, 1977
Pittsburgh, PA	Guttman Oil Company Speers Rd. Belle Vernon, PA 15012	9	585	K	133	D	March 15, 1977
Westover, WV	Exxon Co. USA Terminal P. O. Box 2007 Westover, WV 26505	14	35	K	25	D Z	September 9, 1977
Pittsburgh, PA	Inland Products Inc. Herrs Island Pittsburgh, PA 15222	10	180	J	20	P	March 24, 1977
New Kensington, PA	Penn Glenn Oil Box 128 Parnassus New Kensington, PA 15068	10	30	K	172	Z	February 1, 1977
Natrium, WV	Mobay Chemical Corp. New Martinsville, WV 26155	9		J	90	A	September 22, 1977
Natrium, WV	Mobay Chemical Corp. New Martinsville, WV 26155	9		J	45 30	P	September 22, 1977
Moundsville, WV	Ohio Power Co. - Mitchell Plant P. O. Box K Moundsville, WV 26041	22	2,220	K	60	P	December 7, 1977
Warrenton, OH	Tri-State Asphalt Corp. RD #1, Box 427-A Rayland, OH 43943	15	200	K	2,333	N	May 31, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Brilliant, OH	Ohio Power Company Carninal Pla Box B Brilliant, OH 43913			K	57	P	August 30, 1977
Mingo Junction, OH	Wheeling Pittsburgh Steel Corp. 3rd St. Steubenville, OH 43952		90	K	24	P	November 17, 1977
Steubenville, OH	Atlantic Richfield Company S R T North Box 369 Steubenville, OH 43952	14	120	K	360	D	July 25, 1977
Newell, WV	Quaker State Oil Refining Corp. P. O. Box 336 Newell, WV 26050	9	350	JK	475	R	August 11, 1977
East Liverpool, OH	Parson Coal Co. Inc. P. O. Box 56 East Liverpool, OH 43920		100	J	75	D	November 17, 1977
East Liverpool, OH	Mississippi Ohio Oil, Terminal I P. O. Box 533, River Rd. East Liverpool, OH 43920		200	K	138	D	November 28, 1977
Portland, CT	Cities Service Co. 1 Brownstone Ave. Portland, CT 06480	14	20	K	128	D	March 1, 1979
Midland, PA	Mobil Oil Corporation Rte. 68 Midland, PA 15059	10	600	K	177	Z	March 9, 1977
Industry, PA	Great Lakes Terminal & Trans. Corp. Rte. 68 & Wabash Industry, PA 15052	10		K	105	D	March 9, 1977
Monaca, PA	Arco Polymers Beaver Vally Frankfort Rd. Monaca, PA 15061	15	1,000	K	130	P D	March 4, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Pittsburgh, PA	Sunmark Industries State Rd. Vanport, PA 15009	20	100	K	199	Z	February 16, 1977
Pittsburgh, PA	Texaco Inc. 9 Thorn St. Corapolis, PA 15108	10 10 10	40 20 20	K	483 60	Z	January 28, 1977
Neville Island, PA	Neville Chemical Company Grand Ave. Pittsburgh, PA 15225	9	290	J	238		March 14, 1977
Neville Island, PA	Gulf Oil Co. 400 Grand Ave. Pittsburgh, PA 15225	15	120	K	838	D	February 22, 1977
Pittsburgh, PA	Brunot Island 2849 West Carson St. Pittsburgh, PA 15204			K	217	P	February 16, 1977
Kuttawa, KY	Kuttawa Terminal, Ashland Oil Co. Hwy. 810 Kuttawa, KY 42055			K	140		September 14, 1977
Nashville, TN	Texaco Inc. 61st & Centennial Nashville, TN 37209	9	65	K	68	D	November 22, 1976
Nashville, TN	Shell Oil Co. 56th Ave. N. Nashville, TN 37209	9	30	K	233	D	November 22, 1976
Nashville, TN	Amoco Oil Co. 51st Ave. N. Nashville, TN 37209	9	50	K	115	D	November 22, 1976
Nashville, TN	Gulf Refining Co. 51st Ave. N. & RR Nashville, TN 37202			K	82	D	December 1, 1976

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Nashville, TN	Exxon Co. USA 1740 28th Ave. N. Nashville, TN 37208	9 9	50 35	K	500	D	November 22, 1976
Nashville, TN	Lion Oil Co. 90 Van Buren St. Nashville, TN 37208	9	10	K	84	D	December 1, 1976
Nashville, TN	Triangle Refineries 180 Wharf Ave. Nashville, TN 37210	9	210	K	265	D	November 30, 1976
Nashville, TN	Ashland Oil & Refining Co. 5 Main St. Nashville, TN 37213			K	55	D	November 30, 1976
Nashville, TN	Southern States Asphalt Co. 930 Youngs Lane Nashville, TN 37207	9	15	K	132	D	November 23, 1976
Nashville, TN	Marathon Oil Co. 2920 Hydes Ferry Rd. Nashville, TN 37218	9	35	K	115	D	December 1, 1976
Nashville, TN	E. I. du Pont de Nemours & Co. Old Hickory, TN 37138	12 12 12	15 90 90	K	151	P	January 25, 1977
Nashville, TN	E. I. du Pont de Nemours & Co. Old Hickory, TN 37138	12 12 12	60 43 43	K	151	P	January 25, 1977
Nashville, TN	E. I. du Pont de Nemours & Co. Old Hickory, TN 37138	12 12 12	13 40 40	K	151	P	January 25, 1977
Gallatin, TN	Gallatin Steam Plant Gallatin, TN 37068	9	380	K	357	P	February 14, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Paducah, KY	Paducah Terminal, Ashland Pet. Hwy. 62 Paducah, KY 42001			K	153		September 14, 1977
New Johnsonville, TN	New Johnsonville Steam Plant New Johnsonville, TN 37134	9	2,600	K	545	P	December 7, 1976
Perryville, TN	American Materials Co. P. O. Box 61 Parsons, TN 38363	9	20	K	60	D	December 9, 1976
Chattanooga, TN	General Oils Inc. 817 Pineville Rd. Chattanooga, TN 37401	9	40 20	K	400	D	December 29, 1976
Chattanooga, TN	Rock-Tenn Co. Mill Division Manufacturers Rd. Chattanooga, TN 37405	9	24	K	25	P	January 6, 1977
Chattanooga, TN	Amoco Oil Co. Manufacturers Rd. Chattanooga, TN 37405	8	40	K	101	D	December 17, 1976
Chattanooga, TN	Texaco Inc. Manufacturers Rd. Chattanooga, TN 37405	9	40	K	73	D	January 5, 1977
Knoxville, TN	Texaco Inc. 701 Langford Ave. Knoxville, TN 37920	9 9	10 20	K	150	D	February 10, 1977
Knoxville, TN	Volunteer Asphalt Co. 3111 McClure Lane Knoxville, TN 37920	8	50	K	185	A	December 27, 1976
Calhoun, TN	Bowaters Southern Paper Co. Calhoun, TN 37309	9	45	K	300	P	November 9, 1976

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Jefferson City, MO	Standard Oil Co. Hwy. 63 N. Jefferson City, MO 65101			K	137	Z	May 31, 1977
Sioux City, IA	Jebro, Inc. P. O. Box 2813 Sioux City, IA 51111	7	40	K	870	D	February 14, 1977
Little Rock, AR	Port of Little Rock, AR End of Lindsey Rd. Little Rock, AR 72206	9	400	K	198	Z	December 1, 1976
Muskogee, OK	Frontier Terminal Riverside & Chandler Muskogee, OK 74401	9	600	K	200	P	October 18, 1976
Catoosa, OK	Liquid Wharf Port City 5645 E. Channel Rd. Catoosa, OK 74015	9	195	K	30	D	November 1, 1976
Catoosa, OK	Liquid Wharf Mid-Region Petroleum 5550 E. Channel Rd. Catoosa, OK 74015	9	586	K	110	D	November 1, 1976
Meredosia, IL	Meredosia Power Station P. O. Box 188 Meredosia, IL 62665			K	219	P	November 19, 1976
Meredosia, IL	Meredosia Terminal Box 254 Meredosia, IL 62665	10 10	115 115	K	346 106 25	Z D D	November 22, 1976
Havana, IL	J. D. Streett & Co. Inc. P. O. Box 305 Havana, IL 62644	9	40 20 20	K	90 55	D D	November 16, 1976
Kingston Mines, IL	F S Services Inc. Kingston Mines, IL 61539			K	1,000	Z	February 3, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Peoria, IL	Keystone Steel & Wire 7000 S. Adams St. Peoria, IL 61641	10	715	K	128	P	December 10, 1976
Creve Coeur, IL	Mobil Oil Corp. 1121 Wesley Rd. Creve Coeur, IL 61611	8	450	K	1,184	D	February 11, 1977
North Pekin, IL	Hicks Oil & Gas Co. Rte. 29 & Wesley Rd. North Pekin, IL 61554	10	25	K	2,574	D	February 1, 1977
Peoria, IL	Martin Oil Service Marine Terminal 2200 S. Darst St. Peoria, IL 61607	12	380	K	118	Z	February 2, 1977
East Peoria, IL	Texaco Inc. 1253 West Washington East Peoria, IL 61611	9	300	K	109	D	February 15, 1977
Peru, IL	Smith Oil Corp., Peru Terminal West Market St. Peru, IL 61354	9	600	K	210	D	November 30, 1976
Peru, IL	Foster Grant Co. 508 Brunner St. Peru, IL 61354	9	200	K	75	P	February 1, 1977
Ottawa, IL	Libbey Owens Ford Company P. O. Box 578 Ottawa, IL 61350	9	205	K	57	P	February 18, 1977
Joliet, IL	Amoco Chemical P. O. Box 941 Joliet, IL 60434	10	200	K	242	P	December 2, 1976
Joliet, IL	Collins Station #23 51 W. Jackson St. Joliet, IL 60435	14	1,650	K	200 2,000 40	P P P	December 15, 1976

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Chicago, IL	Blue Island Illinois Clark Oil 13100 S. Kedzie Blue Island, IL 60406	7	450	K	5,000	A	February 2, 1977
Chicago, IL	Apex Motor Fuel Company 3301 S. Kedzie Chicago, IL 60623	11	183	K	260	D	December 2, 1976
Cicero, IL	Mobil Oil Corp. 3801 S. Cicero Ave. Cicero, IL 60650	16	100	K	350	Z	November 19, 1976
Cicero, IL	Cicero Compound Plant Citgo 3737 S. Cicero Ave. Cicero, IL 60650	12	30	K	220	P	November 22, 1976
Forest View, IL	Chemical Petroleum Exchange 5700 West 41st St. Forest View, IL 60650	86	800	K	400	Z	November 11, 1976
Stickney, IL	Ridgeland Station 4300 S. Ridgeland Ave. Stickney, IL 60402	16	2,000	K	619	P	December 21, 1976
Berwyn, IL	Chicago Terminal 4811 S. Harlem Ave. Berwyn, IL 60402	12	550	K	577	D	November 19, 1976
Berwyn, IL	Lake River Terminals Inc. 5005 South Harlem Berwyn, IL 60402			K	982 66	D D	November 29, 1976
Willow Springs, IL	Mannheim Terminal & Warehouse Service C 7600 S. La Grange Rd. Willow Springs, IL 60480	11	120	K	393		December 11, 1976
Lockport, IL	Texaco Inc. Lockport Plant Dock Box 200 Lockport, IL 60441	17	2,600	K	120 40 1,285	X	November 18, 1976

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
Lemont, IL	Union Oil Chicago Ref. Barge Dock Lemont, IL 60439			K	8,000	R	November 16, 1976
Lemont, IL	Tri Central Marine Terminal 20 Stephen St. Lemont, IL 60439	23	3,250	K	584	Z	January 31, 1977
Lemont, IL	North American Car Corp. Terminal P. O. Box 248 Lemont, IL 60439	22	600	JK	690	D	November 17, 1976
Bedford Park, IL	Shell Oil Company 8600 W. 71st St. Bedford Park, IL 60501	12	80	K	1,500	D	November 12, 1976
Bedford Park, IL	Arco Terminal Co. 8800 W. 71st St. Bedford Park, IL 60501	12	104	K	265	D	December 1, 1976
Argo, IL	Gatx Terminals Corp. Argo Terminal P. O. Box 409 Argo, IL 60501	13	140	K	2,500	D	February 5, 1977
Argo, IL	Waterway Terminal Inc. P. O. Box 125 Argo, IL 60501	10	40	K	510	D	November 18, 1976
Chicago, IL	Demert & Dougherty 5000 W. 41st St. Chicago, IL 60650	20	572	K	40	Z	November 29, 1976
Cicero, IL	Marine Oil Co. 4100 S. Cicero Ave. Cicero, IL 60650		600	K	430	D	December 1, 1976
Chicago, IL	Ashland Petroleum Company 3301 S. California Ave. Chicago, IL 60608	12	2,000	K	600	D	January 29, 1977

TABLE 4 (continued)

Port Name	Terminal Name and Address	Depth* (Feet)	Length† (Feet)	Cargo§	Capacity¶ (Mbbl)	Type of Facility**	Date††
E. Chicago, IN	Cities Service Co. 2500 E. Chicago Ave. E. Chicago, IN	15	600	K	4,500	D	October 1, 1979
St. Helens, OR	Boise Cascade Paper Division Dock East End Kaster Rd. St. Helens, OR 97051	10	560	K	40	P	January 24, 1979
Portland, OR	PGE Upper Dock Portland, OR	35	40	K	76	P	January 25, 1979
Umatilla, OR	Tidewater Terminals McNary, OR 97858	24		K	100	D	December 11, 1978

*Depth alongside expressed in feet.
†Wharf or pier length expressed in feet.
§The letter "K" signifies refined petroleum products and the letter "J" signifies crude oil.
¶The storage capacity expressed in thousands of barrels (Mbbl). A maximum of three storage areas is shown for each facility.
**The type of facility described, as follows: R - Refinery, P - Plant, D - Distribution Terminal, A - All, X - Refinery and Plant, Y - Refinery and Distribution Terminal, Z - Plant and Distribution Terminal.
††Date of latest survey or update.

PERMANENT NAVIGATION FACILITIES: U.S. INLAND WATERWAYS

The following is an alphabetic list of 26 inland waterways of the United States including river mileages, controlling depths, name or number of each lock facility, location, and size of lock chamber. The physical size of each lock may not necessarily indicate the maximum size of the tows using each waterway. For example, some of the locks are long enough to handle a 1,190 foot tow while others will require double or multiple locking. Some waterways have other restraints, such as vertical bridge clearances, approach bends, and low water conditions, which dictate the size of the tow.

Flooding affects the operation of the locks in different ways depending upon the design of each facility. For example, most of the dams on the upper Mississippi River are the movable weir type that can be lowered during high water to allow the vessels to pass over the dam without locking; however, some of the newer locks on the upper Mississippi and the newer dams on the Ohio River are fixed structures and locking conditions prevail full time, with no bypass provisions, until the water reaches a maximum operational level and locking procedures cease due to high water.

Other navigational facilities provided are aids-to-navigation installed on the shores (lights or daymarks) and channel buoys placed and maintained by the U.S. Coast Guard. There are Vessel Traffic Control Systems currently in operation in Houston, and one to be operational in New Orleans when radar units are installed. There is also a Vessel Traffic Service (VTS) system for high water stages at Louisville, Kentucky, and full time systems in operation in the harbors of New York City, San Francisco, and Puget Sound, among others.

Several of the existing locks and dams represent a serious constraint to navigation because of their size, age, and operational limitations. Those of specific concern include Lock and Dam 26 on the upper Mississippi River, Gallipolis Lock and Dam on the Ohio River, the Vermillion and Calcasieu Locks on the Gulf Intracoastal Waterway, and the Industrial Lock at New Orleans.

NOTE: Project depth of water is 9 feet unless noted otherwise

1. ALABAMA-COOSA RIVERS: From junction with the Tombigbee River at river mile (hereinafter referred to as RM) 0 to junction with Coosa River at RM 314.

Alabama River

Mile	Lock Name	Lock Size	Lock Location
72.5	Claiborne Lock	600 x 84	Finchburg, AL
133.0	Millers Ferry Lock	600 x 84	Millers Ferry, AL
236.2	Jones Bluff Lock	600 x 84	Benton, AL

2. ALLEGHENY RIVER: From confluence with the Monongahela River to form the Ohio River at RM 0 to the head of the existing project at East Brady, Pennsylvania, RM 72.

Allegheny River

6.7	Lock 2	360 x 56	Pittsburgh, PA
14.5	Lock 3	360 x 56	Barking, PA
24.2	Lock 4	360 x 56	Natrona, PA
30.4	Lock 5	360 x 56	Freeport, PA
36.3	Lock 6	360 x 56	Freeport, PA
45.7	Lock 7	360 x 56	Kittaning, PA
52.6	Lock 8	360 x 56	Templeton, PA
62.2	Lock 9	360 x 56	Rimer, PA

3. APALACHICOLA-CHATTAHOOCHEE AND FLINT RIVERS: Apalachicola River from mouth at Apalachicola Bay (intersection with the Gulf Intracoastal Waterway) RM 0 to junction with Chattahoochee and Flint Rivers at RM 107.8. Chattahoochee River from junction with Apalachicola and Flint Rivers at RM 0 to Columbus, Georgia, at RM 155; and Flint River, from junction with Apalachicola and Chattahoochee Rivers at RM 0 to Bainbridge, Georgia, at RM 28.

Apalachicola-Chattahoochee-Flint Rivers

107.6	Jim Woodruff Lock	450 x 82	Sneads, FL
75.0	Walter F. George Lock	450 x 82	Fort Gaines, GA
46.5	George Andrews Lock	450 x 82	Blakely, GA

4. ARKANSAS RIVER (McCLELLAN-KERR ARKANSAS RIVER NAVIGATION SYSTEM): From junction with Mississippi River at RM 0 to port of Cotoosa, Oklahoma, at RM 448.2.

Arkansas-Verdigris System

10.0	Norrell Lock	600 x 110	
13.2	Lock 2	600 x 110	
49.3	Lock 3	600 x 110	
65.0	Lock 4	600 x 110	Pine Bluff, AR
85.0	Lock 5	600 x 110	
106.3	David D. Terry Lock	600 x 110	Little Rock, AR
123.0	Murray Lock	600 x 110	
152.9	Toad Suck Ferry Lock	600 x 110	Conway, AR
173.9	Lock 9	600 x 110	Morrilton, AR
201.2	Dardanelle Lock	600 x 110	Dardanelle, AR
251.0	Ozark Lock	600 x 110	Ozark, AR
286.8	Lock 13	600 x 110	Fort Smith, AR
313.7	W. D. Mayo Lock	600 x 110	Spiro, OK
330.3	Robert S. Kerr Lock	600 x 110	Sallisaw, OK
359.3	Webbers Falls Lock	600 x 110	Gore, OK
393.2	Chouteau Lock	600 x 110	Wagoner, OK
412.9	Newt Graham Lock	600 x 110	Inola, OK

5. ATCHAFALAYA RIVER: From RM 0 at its intersection with the Gulf Intracoastal Waterway at Morgan City, Louisiana, upstream to junction with Red River at RM 116.8.

No Locks

6. ATLANTIC INTRACOASTAL WATERWAY: Two inland water routes approximately paralleling the Atlantic coast between Norfolk, Virginia, and Miami, Florida, for 1,192 miles via both the Albemarle and Chesapeake Canal and Great Dismal Swamp Canal routes. Project depth: 12 feet.

Albemarle and Chesapeake Canal

Great Bridge	74 x 600

Great Dismal Swamp Canal

Deep Creek	52 x 300
South Mills	52 x 300

7. BLACK WARRIOR-MOBILE RIVERS: Black Warrior River System from RM 2.9, Mobile River (at Chickasaw Creek) to confluence with Tombigbee River at Rm 45. Tombigbee River (to Demopolis at RM 215.4) to port of Birmingham, RM's 374-411 and upstream to head of navigation on Mulberry Fork (RM 429.6), Locust Fork (RM 407.8), and Sipsey Fork (RM 430.4).

Black Warrior-Tombigbee-Mobile Rivers

116.6	Coffeeville Lock	600 x 110	Coffeeville, AL
213.4	Demopolis Lock	600 x 110	Demopolis, AL
261.1	Warrior Lock	600 x 110	Sawyerville, AL
338.1	Oliver Lock	460 x 95	Tuscaloosa, AL
347.0	Holt Lock	600 x 110	Peterson, AL
365.5	Bankhead Lock	600 x 110	Adger, AL

8. COLUMBIA RIVER (COLUMBIA-SNAKE RIVERS INLAND WATERWAYS): From The Dalles at RM 191.5 to Pasco, Washington (McNary Pool), at Rm 330, Snake River from RM 0 at the mouth to RM 231.5 at Johnson Bar Landing, Idaho. Project depth: 7-42 feet.

Columbia-Snake Rivers

Booneville	75 x 500
The Dalles	86 x 675
McNary	86 x 675
John Day	86 x 675
Ice Harbor	86 x 675
Lower Monumental	86 x 675
Little Goose	86 x 675
Lower Granite	86 x 675

9. CUMBERLAND RIVER: Junction with Ohio River at RM 0 to head of navigation, upstream to Carthage, Tennessee, at RM 313.5.

Cumberland River

30.6	Barkley Lock	800 x 110	Gilbertsville, KY
148.7	Cheatham Lock	800 x 110	Ashland City, TN
216.2	Old Hickory Lock	400 x 84	Old Hickory, TN
313.5	Cordell Hull	400 x 84	Carthage, TN

10. GREEN AND BARREN RIVERS: Green River from junction with the Ohio River at RM 0 to head of navigation at RM 149.1. Project depth: 9 feet RM 0-103; Barren joins Green at Rm 103.

Green River

No. 1	84 x 600
No. 2	84 x 600
No. 3	35.8 x 137.5
No. 4	35.8 x 138

Barren River

150.0	Lock 1	360 x 56	Green Castle, KY

Project depth: 5.5 feet

11. GULF INTRACOASTAL WATERWAY: From St. Mark's River, Florida, to Brownsville, Texas, 1,134.5 miles. Project depth: 12 feet.

Gulf Intracoastal Waterway

Algiers	75 x 760
Bayou Boeuf	75 x 1160
Bayou Sorrel	56 x 760
Calcasieu	75 x 1180
Harvey	75 x 425
Port Allen	84 x 1200
Old River	75 x 1200
Vermillion	56 x 1182
Inner Harbor	75 x 640

12. ILLINOIS WATERWAY (CALUMET-SAG CHANNEL): From the junction of the Illinois River with the Mississippi River RM 0 to Chicago Harbor at Lake Michigan, approximately RM 350.

Illinois Waterway

80.2	New LaGrange Lock	600 x 110	Versailles, IL
157.7	Peoria Lock	600 x 110	East Peoria, IL
231.0	Starved Rock Lock	600 x 110	Utica, IL
244.6	Marseilles Lock	600 x 110	Marseilles, IL
271.5	Dresden Island Lock	600 x 110	Morris, IL
286.0	Brandon Road Lock	600 x 110	Joliet, IL
291.1	Lockport Lock	600 x 110	Lockport, IL
326.5	Thomas J. O'Brien Lock	1000 x 110	S. Chicago, IL
327.2	Chicago Harbor Lock	600 x 80	Chicago, IL

13. KANAWHA RIVER: From junction with Ohio River at RM 0 to Rm 90.6 at Deepwater, West Virginia.

Kanawha River

82.8	London Locks	360 x 56 (2)	Montgomery, WV
67.7	Marmet Locks	360 x 56 (2)	Belle, WV
31.1	Winfield Locks	360 x 56 (2)	Winfield, WV

14. KASKASKIA RIVER: From junction with the Mississippi River at RM 0 to RM 36.2 at Fayetteville, Illinois.

Kaskaskia River

0.8, L	Kaskaskia Lock	360 x 84	Modoc, IL

15. KENTUCKY RIVER: From junction with Ohio River at RM 0 to confluence of Middle and North Forks at RM 258.6. Project depth: 6 feet.

Kentucky River

5 Locks	38 x 145
2 Locks	52 x 147
1 Lock	52 x 146
6 Locks	52 x 148

16. LOWER MISSISSIPPI RIVER: From Baton Rouge, Louisiana, RM 233.9 to Cairo, Illinois, RM 953.8.

Lower Mississippi River

No Locks; Project depth: 9-40 feet below Baton Rouge

17. UPPER MISSISSIPPI RIVER: From Cairo, Illinois, RM 953.8 to Minneapolis, Minnesota, RM 1811.4.

Upper Mississippi River

Locks 27	1200 x 110, 600 x 110	Granite City, IL
Locks 26	600 x 110 360 x 110	Alton, IL
Lock 25	600 x 110	Winfield, MO
Lock 24	600 x 110	Clarksville, MO
Lock 22	600 x 110	Hannibal, MO
Lock 21	600 x 110	Quincy, IL
Lock 20	600 x 110	Canton, MO
Lock 19	1200 x 110	Keokuk, IA
Lock 18	600 x 110	Gulfport, IL
Lock 17	600 x 110	New Boston, IL

	Lock 16	600 x 110	E. Muscatine, IL
	Locks 15	600 x 110, 360 x 110	Rock Island, IL
	Lock 14	600 x 110	Davenport, IA
	Lock 13	600 x 110	Fulton, IL
	Lock 12	600 x 110	Bellevue, IA
	Lock 11	600 x 110	Dubuque, IA
	Lock 10	600 x 110	Guttenberg, IA
	Lock 9	600 x 110	Eastman, WI
	Lock 8	600 x 110	Genoa, WI
	Lock 7	600 x 110	LaCrescent, MN
	Lock 6	600 x 110	Trempeleau, WI
	Lock 5A	600 x 110	Fountain City, WI
	Lock 5	600 x 110	Minnesota City, WI
	Lock 4	600 x 110	Alma, WI
	Lock 3	600 x 110	Welch, MN
	Lock 2	600 x 110	Hastings, MN
	Locks 1	400 x 56 (2)	Minneapolis, MN
853.4	St. Anthony Lower Lock	400 x 56	Minneapolis, MN
853.7	St. Anthony Upper Lock	400 x 56	Minneapolis, MN

18. MISSOURI RIVER: From junction with Mississippi River at RM 0 to Sioux City, Iowa, at RM 734.8.

Missouri River

No Locks

19. MONONGAHELA RIVER: From junction with Allegheny River to form the Ohio River at RM 0 to junction of the Tuggart and West Fork Rivers, Fairmont, West Virginia, at RM 128.7.

Monongahela River

11.2, R	Lock 2	720 x 110	Braddock, PA
23.8, R	Lock 3	720 x 56	Elizabeth, PA
41.5, R	Lock 4	720 x 56	Monessen, PA
61.1, R	Maxwell Lock	600 x 84	LaBelle, PA
85.0, L	Lock 7	360 x 56	Greensboro, PA
90.8, L	Lock 8	360 x 56	Point Marion, PA
102.0, L	Morgantown Lock	600 x 84	Morgantown, WV
108.0, L	Hildebrand Lock	600 x 84	Laurel Point, WV
115.4, R	Opekiska Lock	600 x 84	Catawba, WV

20. OHIO RIVER: From junction with the Mississippi River at RM 0 to junction of the Allegheny and Monongahela Rivers at Pittsburgh, Pennsylvania, at RM 981.

Ohio River

6.2	Emsworth Locks	600 x 110 360 x 56	Emsworth, PA

13.3	Dashields Locks	600 x 110 360 x 56	Glenwillard, PA
31.7	Montgomery Locks	600 x 110 360 x 56	Industry, PA
54.4	New Cumberland Locks	1200 x 110 600 x 110	Stratton, OH
84.3	Pike Island Locks	1200 x 110 600 x 110	Wheeling, WV
126.4	Hannibal Locks	1200 x 110 600 x 110	Hannibal, OH
161.7	Willow Island Locks	1200 x 110 600 x 110	Marietta, OH
203.9	Belleville Locks	1200 x 110 600 x 110	Reedsville, OH
237.3	Racine Locks	1200 x 110 600 x 110	New Haven, WV
279.2	Gallipolis Lock	600 x 110 360 x 110	Hogsett, WV
341.1	Greenup Locks	1200 x 110 600 x 110	Greenup, KY
436.2	Meldahl Locks	1200 x 110 600 x 110	Felicity, OH
531.5	Markland Locks	1200 x 110 600 x 110	Warsaw, KY
606.8	McAlpine Locks	1200 x 110 600 x 110 360 x 56	Louisville, KY
720.7	Cannelton Locks	1200 x 110 600 x 110	Cannelton, IN
776.0	Newburgh Locks	1200 x 110 600 x 110	Newburgh, IN
846.0	Uniontown Locks	1200 x 110 600 x 110	Uniontown, KY
876.8	Lock 50	600 x 110	Marion, KY*
903.1	Lock 51	600 x 110	Golconda, IL*
918.5	Smithland Locks (u.c.)	1200 x 110 (2)	Smithland, KY
938.9	Lock 52	1200 x 110 600 x 110	Brookport, IL
962.6	Lock 53	600 x 110	Mound City, IL

21. OUACHITA-BLACK RIVERS: From the mouth of the Black River at its junction with the Red River at RM 0 to RM 351 at Camden, Arkansas.

Ouachita River

25.0	Jonesville Lock	600 x 84	Jonesville, LA
132.0	Columbia Lock	600 x 84	Columbia, LA

*To be phased out in 1980.

22. PEARL RIVER: From junction of West Pearl River with the Rigolets at Rm 0, to Bogalusa, Louisiana, Rm 58.

Pearl River

29.4	Lock 1	310 x 65	Pearl River, LA
40.7	Lock 2	310 x 65	Bush, LA
43.9	Lock 3	310 x 65	Sun, LA

23. RED RIVER: From RM 0 to the mouth of Cypress Bayou at RM 236.

Red River

No Locks

24. TENNESSEE RIVER: From junction with Ohio River at RM 0 to confluence with Holstein and French Rivers at Rm 652.

Tennessee River

22.3, R	Kentucky Lock	600 x 110	Gilbertsville, KY
206.7, L	Pickwick Lock	600 x 110	Savannah, TN
259.4, R	Wilson Lock	600 x 110	Florence, AL
274.9, R	Wheeler Lock	600 x 110	Rogersville, AL
349.0, R	Guntersville Locks	600 x 110	Guntersville, AL
		360 x 60	
424.7, R	Nickajack Lock	600 x 110	S. Pittsburg, TN
471.0, R	Chickamauga Lock	360 x 60	Chattanooga, TN
529.9, L	Watts Bar Lock	360 x 60	Watts Bar Dam, TN
602.3, L	Fort Loudon Lock	360 x 60	Lenoir City, TN

25. WHITE RIVER: From RM 9.8 to RM 255 at Newport, Arkansas.

White River

No Locks

26. WILLAMETTE RIVER: From RM 21 upstream of Portland, Oregon, to Harrisburg, Oregon, at RM 194.

Willamette River

27.0 Willamette Falls Locks

WATERBORNE TRANSPORTATION EQUIPMENT: INLAND WATERWAYS AND MARITIME CARRIERS

The following tables present data on the number, capacities, and ages of the self-propelled vessels (tankships, Table 6) and non-self-propelled tank barges (Table 7) registered in the United States which are suitable for transporting petroleum and petroleum products in bulk on the inland waterways system, the Great Lakes, and coastwise. These data are summarized in Table 5. The Coast Guard divided the equipment into six waterways systems:

1. East Coast
2. West Coast
3. Great Lakes
4. Alaska
5. Hawaii
6. Gulf Intracoastal Waterway and Mississippi River and Tributaries

The U.S. Coast Guard provided data on all certificated tank vessels. The data were divided into the various geographic areas noted above and were verified and updated. Individual vessel owners/operators were solicited for verification and updating. Verification was obtained for over 75 percent of the total listings.

The division of the equipment listing into the six waterways systems reflects its location when certified or recertified. It is important to note that the equipment may not be in service in the system noted in Table 5.

Significant items highlighted in the summaries include:

- Total capacity for all vessels (168,363,611 barrels) has increased fourfold since the 1967 study with the greatest increase in the capacity of self-propelled vessels.

- Vessel construction trends continue toward larger vessels, with higher cargo discharge rates.

- Greater utilization is being made on the inland water-ways of the integrated tow concept.

- Greater utilization is being made of the integrated tug barge for coastwise service.

- While the number of non-self-propelled tank barges increased 45 percent since 1967, the average barrel capacity increased 120 percent (the average Gulf Intracoastal River barge capacity grew from 12,272 barrels to 17,000 barrels, while the average east coast barge capacity increased from 11,060 barrels to 26,394 barrels).

- Twenty-five percent of the self-propelled vessels (tankships) exceeding 5,000 barrels in capacity were built since 1971 and represented an increase of 118.5 percent in total barrel capacity.

- The average capacity of tankships built since 1971 is 627,510 barrels -- an increase of 185.0 percent over the average capacity of tankships in existence prior to 1971 (220,245 barrels). The increased individual capacity is especially reflected in tankships used in the Hawaiian and west coast trades which average 0.6 million and 1.12 million barrels, respectively.

- The Great Lakes area (where draft and tankship port restrictions present limiting factors) is the only area in which there was no growth in average tankship capacity.

TABLE 5

Inland Waterways and Maritime Carriers -- Summary, July 1979

	Waterways System	Greater Than 5,000 Barrels Capacity: Number of Units	Greater Than 5,000 Barrels Capacity: Total Capacity (barrels)	Less Than 5,000 Barrels Capacity: Number of Units	Less Than 5,000 Barrels Capacity: Total Capacity (barrels)	Total Capacity: Number of Units	Total Capacity: Total Capacity (barrels)
Self-Propelled Tank Vessels (Tankships)	1. East Coast*	152	44,722,553	27	24,190	179	44,746,743
	2. West Coast†	55	22,172,689	10	6,391	65	22,179,080
	3. Great Lakes§	8	373,270	6	7,988	14	381,258
	4. Alaska¶	0	0	3	1,244	3	1,244
	5. Hawaii**	12	11,566,547	0	0	12	11,566,547
	6. Gulf & Mississippi††	74	18,145,074	5	5,169	79	18,150,243
	TOTAL	301	96,980,133	51	44,982	352	97,025,115
Non-Self-Propelled Vessels (Tank Barges)	1. East Coast§§	335	10,865,387	82	140,591	417	11,005,978
	2. West Coast¶¶	91	2,787,437	36	67,363	127	2,854,800
	3. Great Lakes***	91	1,425,053	9	13,614	100	1,438,667
	4. Alaska†††	9	131,433	30	44,523	39	175,956
	5. Hawaii§§§	6	100,567	1	818	7	101,385
	6. Gulf & Mississippi¶¶¶	2,731	54,581,191	550	1,180,519	3,281	55,761,710
	TOTAL	3,263	69,891,068	708	1,447,428	3,971	71,338,496
					TOTAL	4,323	168,363,611

*For details, see Table 6, System 1.
†For details, see Table 6, System 2.
§For details, see Table 6, System 3.
¶For details, see Table 6, System 4.
**For details, see Table 6, System 5.
††For details, see Table 6, System 6.
§§For details, see Table 7, System 1.
¶¶For details, see Table 7, System 2.
***For details, see Table 7, System 3.
†††For details, see Table 7, System 4.
§§§For details, see Table 7, System 5.
¶¶¶For details, see Table 7, System 6.

TABLE 6

Tankships

System	Year Built	Greater Than 5,000 Barrels Capacity: Number of Vessels	Greater Than 5,000 Barrels Capacity: Total Capacity (barrels)	Less Than 5,000 Barrels Capacity: Number of Vessels	Less Than 5,000 Barrels Capacity: Total Capacity (barrels)
1. East Coast	Prior to 1932	9	107,883	8	8,072
	1933	0	0	2	1,353
	1934	0	0	0	0
	1937	1	25,530	1	448
	1938	3	19,905	1	452
	1941	2	16,500	1	105
	1942	2	131,208	0	0
	1943	2	410,957	1	193
	1944	8	1,287,883	0	0
	1945	12	2,038,993	1	384
	1946	1	15,000	1	544
	1947	2	25,500	0	0
	1948	1	611,873	0	0
	1949	1	229,615	1	409
	1950	0	0	1	1,227
	1951	2	515,894	0	0
	1952	2	459,230	0	0
	1953	6	1,207,418	1	1,102
	1954	8	1,748,507	1	1,200
	1955	2	272,114	0	0
	1956	3	691,175	0	0
	1957	8	1,963,482	0	0
	1958	7	1,709,618	1	1,000
	1959	6	1,861,151	0	0
	1960	6	2,062,236	0	0
	1961	3	1,347,249	1	791
	1962	1	274,355	1	70
	1963	4	1,021,740	0	0

(continued)

Tankships (continued)

System	Year Built	Greater Than 5,000 Barrels Capacity: Number Of Vessels	Greater Than 5,000 Barrels Capacity: Total Capacity (barrels)	Less Than 5,000 Barrels Capacity: Number of Vessels	Less Than 5,000 Barrels Capacity: Total Capacity (barrels)
1. East Coast (continued)	1964	3	}	0	0
	1965	2	}	0	0
	1966	1	}	0	0
	1967	1	} 6,176,747	0	0
	1968	4	}	0	0
	1969	7	}	0	0
	1970	2	}	1	4,370
	1971	3	1,419,790	1	1,020
	1972	2	1,258,000	1	950
	1973	2	2,216,908	0	0
	1974	7	4,360,400	1	500
	1975	4	1,361,331	0	0
	1976	4	3,377,144	0	0
	1977	5	2,654,987	0	0
	1978	2	1,717,000	0	0
	1979	1	125,230	0	0
TOTAL		152	44,722,553	27	24,190
2. West Coast	Prior to 1932	0	0	2	111
	1942	1	228,725	0	0
	1943	3	656,715	0	0
	1944	3	422,941	0	0
	1945	3	612,406	0	0
	1947	0	0	1	65
	1949	1	230,997	0	0
	1950	1	229,615	0	0
	1952	1	143,300	0	0

(continued)

Tankships (continued)

System	Year Built	Greater Than 5,000 Barrels Capacity: Number of Vessels	Greater Than 5,000 Barrels Capacity: Total Capacity (barrels)	Less Than 5,000 Barrels Capacity: Number of Vessels	Less Than 5,000 Barrels Capacity: Total Capacity (barrels)
2. West Coast (continued)	1953	2	298,559	0	0
	1954	2	294,832	1	2,026
	1956	0	0	1	452
	1957	1	28,000	0	0
	1958	2	531,446	0	0
	1959	3	867,058	0	0
	1961	2	769,441	0	0
	1963	1	395,401	1	3,110
	1970	3	1,659,779	0	0
	1971	3	1,714,420	1	23
	1972	3	1,679,382	0	0
	1973	5	2,587,487	0	0
	1974	0	0	2	104
	1975	0	0	1	500
	1976	5	2,476,206	0	0
	1977	8	4,321,301	0	0
	1978	2	2,024,678	0	0
TOTAL		55	22,172,689	10	6,391
3. Great Lakes	Prior to 1932	3	121,548	1	1,162
	1937	1	66,681	0	0
	1942	0	0	1	197
	1946	0	0	1	785
	1950	0	0	1	1,300
	1952	0	0	1	214
	1960	0	0	1	4,330
	1973	1	6,296	0	0

(continued)

Tankships (continued)

System	Year Built	Greater Than 5,000 Barrels Capacity: Number of Vessels	Greater Than 5,000 Barrels Capacity: Total Capacity (barrels)	Less Than 5,000 Barrels Capacity: Number of Vessels	Less Than 5,000 Barrels Capacity: Total Capacity (barrels)
3. Great Lakes (continued)	1974	1	47,969	0	0
	1975	1	55,055	0	0
	1978	1	75,721	0	0
TOTAL		8	373,270	6	7,988
4. Alaska	1954	0	0	1	952
	1966	0	0	1	167
	1976	0	0	1	125
TOTAL		0	0	3	1,244
5. Hawaii	1945	1	31,292	0	0
	1962	1	910,081	0	0
	1973	3	2,218,961	0	0
	1974	3	2,114,917	0	0
	1975	1	2,055,432	0	0
	1976	1	2,055,432	0	0
	1977	2	2,180,432	0	0
TOTAL		12	11,566,547	0	0

Tankships (continued)

System	Year Built	Greater Than 5,000 Barrels Capacity: Number of Vessels	Greater Than 5,000 Barrels Capacity: Total Capacity (barrels)	Less Than 5,000 Barrels Capacity: Number of Vessels	Less Than 5,000 Barrels Capacity: Total Capacity (barrels)
6. Gulf Intracoastal Waterway and Mississippi River and Tributaries	1940	1	15,650	0	0
	1942	2	480,603	0	0
	1943	7	1,088,153	0	0
	1944	10	1,809,348	0	0
	1945	6	1,031,506	0	0
	1950	1	254,924	0	0
	1953	5	1,234,284	0	0
	1954	2	458,268	0	0
	1956	4	919,879	0	0
	1957	3	776,946	0	0
	1958	4	719,513	0	0
	1959	6	1,724,544	0	0
	1960	2	535,382	0	0
	1961	2	378,771	0	0
	1962	1	374,185	0	0
	1963	1	212,420	0	0
	1964	2	424,801	0	0
	1965	1	212,420	0	0
	1966	1	335,269	0	0
	1968	1	335,269	0	0
	1969	1	334,799	0	0
	1970	2	497,893	0	0
	1971	2	559,923	0	0
	1972	0	0	1	1,598
	1973	0	0	1	816
	1975	2	563,281	2	612
	1976	2	363,332	0	0
	1978	2	1,289,711	1	2,143
	1979	1	1,214,000	0	0
TOTAL		74	18,145,074	5	5,169

TABLE 7

Tank Barges

System	Year Built	Greater Than 5,000 Barrels Capacity: Number of Vessels	Greater Than 5,000 Barrels Capacity: Total Capacity (barrels)	Less Than 5,000 Barrels Capacity: Number of Vessels	Less Than 5,000 Barrels Capacity: Total Capacity (barrels)
1. East Coast	Prior to 1932	4	47,571	12	25,659
	1933	1	13,418	1	4,238
	1934	4	66,290	1	626
	1935	1	17,085	1	609
	1936	3	44,021	1	4,285
	1937	6	72,563	3	10,065
	1938	1	5,205	1	4,000
	1939	2	14,500	1	1,900
	1940	3	40,899	1	271
	1941	6	60,893	1	2,000
	1942	3	25,000	2	3,052
	1943	2	150,320	2	3,893
	1944	2	18,700	1	1,760
	1945	11	245,830	4	4,185
	1946	3	44,858	1	773
	1947	10	182,243	0	0
	1948	19	277,940	0	0
	1949	16	215,270	1	2,140
	1950	3	37,851	1	1,000
	1951	11	198,743	1	940
	1952	4	90,180	2	1,290
	1953	4	64,770	2	769
	1954	4	58,352	0	0
	1955	7	156,096	4	11,014
	1956	12	218,154	3	3,129
	1957	10	178,536	3	4,479
	1958	7	152,297	6	9,685
	1959	14	235,018	1	428
	1960	5	112,290	2	3,068
	1961	6	117,778	4	1,121

(continued)

Tank Barges (continued)

System	Year Built	Greater Than 5,000 Barrels Capacity: Number of Vessels	Greater Than 5,000 Barrels Capacity: Total Capacity (barrels)	Less Than 5,000 Barrels Capacity: Number of Vessels	Less Than 5,000 Barrels Capacity: Total Capacity (barrels)
1. East Coast (continued)	1962	4	116,836	3	3,712
	1963	10	197,477	1	1,635
	1964	2	70,105	2	3,250
	1965	12	273,115	2	2,000
	1966	6	168,840	3	5,516
	1967	7	350,459	2	7,128
	1968	15	610,814	3	5,450
	1969	18	648,523	0	0
	1970	14	958,878	0	0
	1971	19	1,104,153	1	4,500
	1972	16	959,731	1	221
	1973	11	637,102	0	0
	1974	7	399,110	0	0
	1975	5	694,362	0	0
	1976	3	210,507	0	0
	1977	1	291,080	0	0
	1978	1	11,624	1	800
TOTAL		335	10,865,387	82	140,591
2. West Coast	Prior to 1932	4	28,165	2	6,744
	1940	1	5,800	1	4,750
	1941	0	0	1	2,200
	1942	2	14,779	0	0
	1943	5	42,058	2	6,250
	1944	5	882,159	1	325
	1945	1	11,600	0	0
	1946	4	41,500	1	900
	1947	1	14,000	0	0
	1948	3	35,069	0	0

(continued)

Tank Barges (continued)

System	Year Built	Greater Than 5,000 Barrels Capacity: Number of Vessels	Greater Than 5,000 Barrels Capacity: Total Capacity (barrels)	Less Than 5,000 Barrels Capacity: Number of Vessels	Less Than 5,000 Barrels Capacity: Total Capacity (barrels)
2. West Coast (continued)	1949	5	84,474	0	0
	1950	1	26,220	0	0
	1951	2	43,220	0	0
	1952	2	34,365	0	0
	1953	4	97,972	0	0
	1954	4	104,196	0	0
	1955	4	125,165	0	0
	1956	1	39,359	0	0
	1957	2	70,698	2	4,816
	1958	1	26,286	1	1,285
	1959	2	71,637	1	674
	1960	3	66,437	0	0
	1961	1	13,702	1	4,019
	1962	2	21,084	0	0
	1963	3	44,094	0	0
	1964	1	27,554	0	0
	1965	1	21,000	4	765
	1966	6	164,772	3	5,002
	1967	4	49,057	4	5,518
	1968	2	117,601	0	0
	1969	4	88,021	1	3,930
	1970	5	227,628	2	7,330
	1971	0	0	1	4,509
	1972	0	0	3	3,000
	1973	1	24,500	1	1,000
	1974	2	37,315	2	2,297
	1975	0	0	1	1,000
	1976	2	85,950	1	1,049
TOTAL		91	2,787,437	36	67,363

Tank Barges (continued)

System	Year Built	Greater Than 5,000 Barrels Capacity: Number of Vessels	Greater Than 5,000 Barrels Capacity: Total Capacity (barrels)	Less Than 5,000 Barrels Capacity: Number of Vessels	Less Than 5,000 Barrels Capacity: Total Capacity (barrels)
3. Great Lakes	Prior to 1932	1	5,152	0	0
	1934	0	0	1	4,762
	1936	1	17,356	0	0
	1937	1	6,650	1	761
	1939	1	10,500	0	0
	1946	1	9,961	0	0
	1948	4	45,900	0	0
	1949	2	44,500	3	1,449
	1951	6	124,786	0	0
	1952	1	20,000	0	0
	1957	1	24,500	0	0
	1959	1	18,000	0	0
	1961	4	51,458	0	0
	1962	9	183,500	1	1,555
	1963	7	101,233	1	1,695
	1964	9	109,455	0	0
	1965	1	11,511	0	0
	1966	1	19,600	0	0
	1967	4	37,314	0	0
	1968	2	18,340	1	1,869
	1969	1	21,912	0	0
	1970	5	74,580	0	0
	1971	2	27,038	0	0
	1972	1	36,000	1	1,523
	1973	3	30,466	0	0
	1974	5	71,360	0	0
	1975	6	100,334	0	0
	1976	3	84,676	0	0
	1977	6	94,971	0	0
	1978	2	24,000	0	0
TOTAL		91	1,425,053	9	13,614

Tank Barges (continued)

System	Year Built	Greater Than 5,000 Barrels Capacity: Number of Vessels	Greater Than 5,000 Barrels Capacity: Total Capacity (barrels)	Less Than 5,000 Barrels Capacity: Number of Vessels	Less Than 5,000 Barrels Capacity: Total Capacity (barrels)
4. Alaska	1940	0	0	1	1,900
	1941	0	0	2	3,033
	1943	1	5,313	2	488
	1945	1	79,600	0	0
	1946	0	0	4	4,006
	1948	0	0	1	2,000
	1949	0	0	1	700
	1951	0	0	2	1,843
	1952	0	0	3	2,487
	1953	2	14,300	0	0
	1956	1	5,000	1	1,930
	1957	0	0	2	3,406
	1959	0	0	1	2,200
	1961	0	0	1	1,400
	1964	1	7,600	2	5,217
	1966	0	0	1	1,400
	1967	0	0	1	903
	1970	2	12,020	1	342
	1971	1	7,600	1	1,400
	1972	0	0	2	5,346
	1977	0	0	1	4,522
TOTAL		9	131,433	30	44,523
5. Hawaii	1957	2	43,277	0	0
	1958	0	0	1	818
	1960	1	38,900	0	0
	1969	1	6,370	0	0
	1970	2	12,020	0	0
TOTAL		6	100,567	1	818

Tank Barges (continued)

System	Year Built	Greater Than 5,000 Barrels Capacity: Number of Vessels	Greater Than 5,000 Barrels Capacity: Total Capacity (barrels)	Less Than 5,000 Barrels Capacity: Number of Vessels	Less Than 5,000 Barrels Capacity: Total Capacity (barrels)
6. Gulf Intracoastal Waterway and Mississippi River and Tributaries	Prior to 1932	3	20,642	15	33,992
	1933	2	16,085	3	7,455
	1934	1	6,500	4	7,057
	1935	1	7,500	5	18,500
	1936	6	53,660	5	9,421
	1937	13	108,257	6	9,765
	1938	3	36,640	3	6,186
	1939	10	91,802	5	13,411
	1940	26	294,550	10	16,098
	1941	21	204,609	1	95
	1942	19	180,387	2	8,190
	1943	15	134,110	2	5,367
	1944	10	87,177	3	5,470
	1945	14	152,290	11	30,479
	1946	10	144,683	2	4,440
	1947	33	1,180,275	3	2,820
	1948	56	743,819	7	14,582
	1949	45	709,613	7	18,867
	1950	22	562,754	6	13,630
	1951	45	931,240	11	29,853
	1952	48	875,325	6	15,540
	1953	13	507,734	5	16,440
	1954	10	153,779	23	73,090
	1955	43	679,469	16	26,012
	1956	40	518,242	15	43,526
	1957	56	865,368	25	45,576
	1958	50	622,207	18	44,376
	1959	49	699,935	13	25,505
	1960	80	1,785,724	21	55,134
	1961	83	1,103,041	21	37,592

(continued)

Tank Barges (continued)

System	Year Built	Greater Than 5,000 Barrels Capacity: Number of Vessels	Greater Than 5,000 Barrels Capacity: Total Capacity (barrels)	Less Than 5,000 Barrels Capacity: Number of Vessels	Less Than 5,000 Barrels Capacity: Total Capacity (barrels)
6. Gulf Intracoastal Waterway and Mississippi River and Tributaries (continued)	1962	69	1,251,726	5	8,181
	1963	83	1,432,191	21	33,358
	1964	80	3,149,849	20	36,607
	1965	80	1,252,715	17	29,991
	1966	116	2,957,181	16	41,497
	1967	151	3,411,398	30	58,146
	1968	145	2,643,862	36	72,948
	1969	121	2,251,961	25	60,506
	1970	104	2,349,886	34	71,528
	1971	118	2,550,723	13	26,423
	1972	69	1,574,618	14	28,776
	1973	140	2,671,666	9	15,821
	1974	179	3,973,045	10	10,008
	1975	162	3,955,464	11	21,341
	1976	112	2,177,811	14	23,419
	1977	80	1,448,918	0	0
	1978	81	1,826,957	1	3,500
	1979	14	223,803	0	0
TOTAL		2,731	54,581,191	550	1,180,519

GLOSSARY

American Waterways Operators -- nongovernmental organization composed of barge and towboat owners and operators on navigable coastal and inland waterways that provides information on safety, shipbuilding, and maintenance; provides committee liaison with the U.S. Coast Guard, U.S. Army Corps of Engineers, the Maritime Administration, and the Federal Communications Commission.

Army Corps of Engineers -- that portion of the U.S. Army which has the responsibility for planning, improving, and maintaining the nation's waterways, including harbors.

articulated tug barge -- a tandem vessel arrangement consisting of an oceangoing tug and an unmanned ocean barge joined together in a deep notch arrangement with a rigid but quick release connection at the stern of the barge with no relative motion between them. Rigidly connected articulated tug barges combine the speed and maneuverability of a ship with the economics of a tug and barge.

barge -- general name given to the flat-bottomed vessel especially adapted for the transportation of bulk cargoes. Barges can be self-propelled, towed, or pushed.

barrel -- the standard unit of liquid volume in the petroleum industry; equal to 42 U.S. gallons.

bunkering -- to fill a ship's storage compartment with coal or oil.

buoy -- a floating object anchored on station to be used as an aid to mariners to mark the navigable limits of channels, submerged dangers, isolated rocks, etc.

cabotage (laws) -- legislation designed to specify trade routes between two points within a country or within coastal waters.

Clean Air Act -- commonly used term for the clean air amendments of 1970 that set in motion a nationwide federal and state program to achieve acceptable air quality by establishing national standards of ambient air quality to protect public health.

Clean Water Act -- commonly used term for the 1977 amendments to the Federal Water Pollution Control Act that extended U.S. national jurisdiction for water pollution control to the ocean beyond the contiguous zone where the fisheries and other natural resources of the U.S. may be adversely affected.

Coast Guard -- the agency of the U.S. Department of Transportation which has the responsibility of providing for the safety of people and property associated with the water. This responsibility encompasses such areas as navigation aid systems, communication systems, vessel traffic systems, cargo information, pollution prevention, licensing of marine personnel, inspection and certification of vessels used in the marine transportation of petroleum and hazardous cargoes, etc.

draft -- the depth of a vessel below the waterline.

DWT -- deadweight tonnage; commonly used term to express the carrying capacity of a cargo vessel; i.e., cargo, fuel, provisions (stores), and personnel.

Environmental Impact Statement (EIS) -- the written evaluation, required by law, of the effect on the environment of any proposed project.

Environmental Protection Agency (EPA) -- an independent federal agency in the Executive Branch which coordinates governmental action in regard to the environment.

fleeting area -- an area in a harbor or on a waterway where barges or tows are held awaiting pickup, loading, etc.

Gulf Intracoastal Waterway -- the navigable 1,800-mile waterway from Brownsville, Texas, to St. Marks, Florida.

hawser -- a large rope for towing, mooring, or securing a ship.

Jones Act -- commonly used term for the Merchant Marine Act of 1920 that provides for the protection of the U.S. merchant fleet by excluding foreign-built, owned, or operated ships from the U.S. domestic trades. The Jones Act covers all waterborne transportation between U.S. ports, including inland waterways, Great Lakes, and the oceanborne trade between the U.S. mainland and the noncontiguous areas of Alaska, Hawaii, and Puerto Rico; also designates all vessel personnel, longshoremen, and harbor workers as "seamen" and wards of the federal court.

Kort nozzle -- a circular steel shroud which encompasses a propeller. The nozzle has a cross-section similar to an air foil which gives added thrust efficiency.

lash -- lighter aboard ship barges.

M -- thousand.

Maritime Administration (MARAD) -- an agency of the U.S. Department of Commerce that administers programs to aid in the development, promotion, and operation of the U.S. merchant marine industry, including emergency merchant ship operations.

navigational aids -- the equipment (buoy markers, lighthouses, radio beams, etc.) established and maintained by the Coast Guard to increase navigational safety and to provide faster and more accurate vessel positioning capabilities.

navigational facilities -- the locks, dams, mooring facilities, harbors, ports, etc., that are built, replaced, and maintained in order to provide an efficient waterborne transportation system.

Occupational Safety and Health Administration (OSHA) -- a unit of the U.S. Department of Labor which develops and promulgates occupational safety and health standards, develops and issues regulations, conducts investigations and inspections to determine regulatory compliance, and issues citations and proposes penalties for noncompliance with safety and health standards and regulations.

scow -- a large flat-bottomed boat with broad square ends.

Title XI -- the portion of the Merchant Marine Act of 1936 as amended in 1970 that provides for federal assistance in the financing of tank vessels used solely in domestic trade. The Merchant Marine Act of 1970, which amended the 1936 Merchant Marine Act, represents a number of changes designed to make the Maritime Administration Merchant Marine Program more attractive to private operators.

U.S. Flag Fleet -- all ships registered in the United States.

Vessel Traffic Services (VTS) -- an integrated system encompassing the variety of technologies, equipment, and people employed to coordinate vessel movements in or approaching a port or waterway.

waterway -- the more than 25,000 miles of navigable rivers, canals, and channels in the United States, maintained to a depth of at least nine feet.