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CONTENTS

Volume 1

	Page
Letter of Submittal	v
CHAPTER I. A PROGRAM FOR WATER RESOURCES DEVELOPMENT	1
II. PROJECT CONSTRUCTION AND OPERATIONS	
PROGRESS	4
1. Navigation	4
2. General Flood Control	7
3. Multiple-Purpose (Power) Projects	10
4. Hydroelectric Power Production	12
5. Mississippi River Flood Control	16
6. Niagara Remedial Works	17
7. General Operations	18
III. FUNDING TRENDS	21
IV. CURRENT PROJECT PLANNING AND DEVELOPMENT	25
1. Program Policy Matters	25
2. Examinations and Surveys	27
3. Board of Engineers for Rivers and Harbors	29
4. Beach Erosion Board	29
5. Advance Engineering and Design	30
6. Collection and Study of Basic Data	30
V. COLLATERAL PROGRAM BENEFITS	33
1. Water Supply-Drought Relief	33
2. Public Use of Project Areas	33
VI. OTHER CIVIL WORKS ACTIVITIES	35
1. Flood Fighting and Other Emergency Operations.....	35
2. Administration of Laws for Protection of Navigable Waters	37
3. Regulation of Hydraulic Mining, California.....	38
4. United States Lake Survey	39
5. Washington, D. C., Water Supply	39
6. St. Lawrence River Joint Board of Engineers.....	40
7. Foreign Technical Assistance	40
8. Work for Other Agencies	41
VII. ECONOMY MEASURES	42
1. Overhead, Field Offices and Personnel	42
2. Civil Works Investigations Program	43

	Page
CHAPTER VIII. FISCAL TABLES	47
Appropriations	47
Accrued Expenditures (Costs)	48
Funds Transferred from Other Departments.....	50
Funds Advanced by Local Interests	50
 IX. WATER-BORNE COMMERCE OF UNITED STATES	 51
Net Total Water-borne Commerce, Calendar Years 1947-53	 54
Foreign and Domestic Commerce by Type of Traffic and Commodity, Calendar Year 1953	 55
Commerce at Project Harbors, Except Great Lakes, Cal- endar Year 1953	 64
Commerce on the Great Lakes, Calendar Year 1953.....	75
Commerce on Project Rivers and Canals, Calendar Year 1953	 79
Ton-mileage of Freight Carried on Inland Waterways, Calendar Year 1953	 87
Ton-mileage of Freight Carried on Great Lakes, Calendar Year 1953	 88
Comparative Statement of Traffic, Mississippi River System, Calendar Years 1944-53	 89
Comparative Statement of Traffic, Mississippi River, Calendar Years 1944-53	 90

Volume 2

Reports on individual project operations and related Civil Works activities, published as a separate volume.

10 DECEMBER 1954

SUBJECT: Annual Report on Civil Works Activities, Fiscal Year 1954

TO: THE SECRETARY OF THE ARMY

1. I submit herewith a report for the fiscal year 1954 on the civil functions of the Department of the Army which are administered by the Corps of Engineers.

2. The format of my report has been revised to present information in a more concise and readable form. The first of two volumes comprises a brief description and summary of the entire civil works activity of the Corps of Engineers, and of the features and accomplishments which characterized it during the year. The second volume sets forth the detailed engineering, fiscal and statistical data, pertaining to the authorized program in a manner similar to previous annual reports of the Chief of Engineers.

3. The civil works which are the subject of this report include the planning, construction, and operation of improvements for navigation and flood control, and the multiple-purpose water resource developments associated therewith, which have been authorized by Congress under the River and Harbor and Flood Control laws. It is my hope in presenting a report in this format to facilitate official and public understanding of a program that in comparatively recent years has grown to be a major segment of the Federal public works activity. Accordingly, I should like to call attention briefly to the major features of the program, to accomplishments during the past year, and to some of the problems involved in administration of the program.

4. The summary of commercial statistics shows a continuation of the growth of waterborne commerce of the United States. For example, waterborne commerce on inland waterways in calendar year 1953 reached an all-time high of 200 billion ton-miles, as compared to 182 billion ton-miles in the previous record year of 1951. The movement of bulk and other commodities on the inland waterways, excluding the Great Lakes, has increased eightfold during the past 25 years. During the fiscal year 1954, 6 navigation improvements were completed for use by vessel traffic and 15 improvements were under construction at the end of the year. Maintenance operations were conducted at 235 harbors and waterways. I feel that the aggressive prosecution of the major navigation and river stabilization program on the Missouri River, and modernization of works on the Warrior, Upper Mississippi, and Green Rivers, was of particular significance.

5. Flood-control activities were continued under the general, or nationwide, program and in the alluvial valley of the Mississippi River. Under the general program, 51 projects were under construction at the close of the fiscal year and 3 projects were placed in useful operation. Ninety-seven flood-control dams and reservoirs were operated and maintained. These works, together with multiple-use developments constructed under the flood-control program, have cost \$1,570 million through fiscal year 1954. During the same period they have already prevented flood losses aggregating \$1,140 million.

6. The single large project for flood control and navigation in the alluvial valley of the Mississippi has, since its authorization in 1928, become the basic framework for protection and development of that valley from Cairo, Ill., to the Gulf of Mexico. During the fiscal year 1954, 31 miles of main-line levees were completed, together with numerous other essential elements. At the end of the fiscal year, \$844 million had been expended on this work, and we estimate that the project has returned over \$5 for every Federal dollar invested.

7. Comprehensive multiple-purpose projects for development of river basins in the combined interests of navigation, flood control, hydroelectric power and related water uses comprise a principal segment of the civil-works construction currently underway. During the year, primary purpose features at 4 projects were fully completed and some features at 8 additional projects were placed in useful operation. Twenty-two multiple-purpose dams and reservoirs were under construction at the end of the year. Maintenance activities were conducted at the 26 projects in full or partial operating status. Additional hydroelectric generating capacity added at 11 multiple-purpose developments during the year totaled over 803,000 kilowatts. Of this amount 70 percent was added at 6 new plants which began initial operation in the fiscal year. This total generating capacity represents about 8 percent of the new capacity added to the Nation's utility systems. Of particular significance were the additions which assisted in relieving power shortages in the Pacific Northwest, where 398,000 kilowatts of new capacity were made available to the Northwest Power Pool by projects of the Corps of Engineers. Essentially all of the power produced is marketed, under existing law, by the Secretary of the Interior.

8. Along with the progress made in project construction, the planning and development of additional civil-works projects was actively continued. During the year, 84 reports on proposed improvements were transmitted to Congress, this survey program

being the basis for the sound development of the Nation's water resources as administered by the Corps of Engineers. In the last half of the fiscal year, the recommended improvements were under consideration by the Committee on Public Works of the House of Representatives for inclusion in an omnibus authorization bill, the first to be considered since the Flood Control and River and Harbor Act of 1950. Testimony was furnished by my staff as requested by the Committee on all reports which had been submitted during the previous 4 years. As later passed, the act authorized new projects or project modifications at a total Federal cost for construction of approximately \$700 million, and provided over \$400 million in monetary authorizations for continuation of major river basin plans.

9. In addition to serving their primary functions, the projects constructed and operated by the Corps of Engineers produced many collateral benefits. Of particular importance during a year of serious drought was the augmentation of river flows, provided by reservoir operation, to provide needed water supplies and to relieve pollution conditions in the Southwest and on major rivers such as the Missouri and lower Mississippi. These reservoirs have also become of major importance as centers of recreational activity, as demonstrated by a record attendance of some 40 million visitor-days during the calendar year 1953.

10. This civil-works activity has been carried on by the normal decentralized organization of the Corps, comprised of 11 division and 41 district offices. These field offices, together with certain additional division and district offices, also handle the military construction programs of the Army and Air Force. During the fiscal year, 94 percent of all civil-works construction was performed by contract. Reductions in overhead costs continued; action was initiated to eliminate one division office; and numerous technical improvements leading to savings in engineering and construction costs were introduced.

11. I should also like to call attention briefly to the fact that during this period the Corps of Engineers has been involved, and in fact has taken a leading part, in a number of efforts to determine or reach agreement on basic policies affecting water resource development. These have included the following:

a. Agreement between the Corps of Engineers, the Department of the Interior, and the Federal Power Commission on mutually acceptable practices in allocating costs for multiple-purpose projects with power, and in estimating the economic feasibility of power projects.

b. An agreement with the Fish and Wildlife Service for the purpose of promoting sound planning of fish and wildlife matters related to civil-works projects of the Corps of Engineers.

c. The development of means, in coordination with other Federal agencies, for strengthening inter-agency coordination in water resource development, which contributed towards establishment by the President, in May 1954, of the "Inter-Agency Committee on Water Resources."

d. Full cooperation with the Task Force on Water Resources and Power of the "Hoover Commission" in its studies of the functions and organizations of the executive branch of the Federal Government.

12. During the year the Secretaries of the Army and the Interior adopted a major revision of real estate acquisition policy designed to reduce the amount of land acquired in fee at reservoir projects. The Corps of Engineers has taken necessary action to place this revised policy in effect. Also during the year considerable congressional interest developed in the "partnership" policy, which provides for participation by non-Federal interests in the development of hydroelectric power in connection with Federal water resources improvements. The Corps was requested to assist in the development of these policies and to prepare comments for the Department of the Army on a number of bills involving partnership projects. Four projects of this nature were authorized by Congress.

13. Even though appropriations and expenditures for civil works were reduced substantially below the levels of the past 2 years, the fiscal year 1954 was a most active one. Five new navigation improvements and four new flood-control projects were initiated during the year. This moderate number of new starts was indicative of a renewed interest in keeping the program active and in line with the expanding needs of the country in the field of water resource development.

14. I feel that for the civil-works program as a whole, the fiscal year 1954 was one of substantial accomplishment in the provision of needed public improvements; and that in the field of water-resource policy and procedure important foundations were laid for sound and coordinated progress in future years.

S. D. STURGIS, JR.,
Major General, USA,
Chief of Engineers.

CHAPTER I

A PROGRAM FOR WATER RESOURCES DEVELOPMENT

The Civil Works program of the Corps of Engineers is a principal segment of Federal water-resources development. It is authorized by the Congress for accomplishment under the direction of the Secretary of the Army and the supervision of the Chief of Engineers, and includes improvement works for navigation, flood control, and protection against beach erosion. There also are comprehensive multiple-purpose projects for development of river basins in the combined interests of navigation, flood control, hydroelectric power, irrigation, major drainage, industrial and municipal water supply, recreation, pollution abatement, conservation of fish and wildlife and other benefits.

Scope of the program. Navigation improvements at coastal and Great Lakes harbors generally involve the dredging of channels and anchorages, and frequently the protection of entrances by jetties and the creation of protected areas by breakwaters. Rivers are improved for navigation by clearing and snagging, dredging, construction of regulating works, and canalization by locks and dams. Flood control is accomplished by improving the channels of streams to increase carrying capacity, by creation of diversion channels, by construction of reservoirs for storage or detention of flood flows, and by levee and floodwall construction for protection of areas subject to damage. Projects for beach erosion control entail principally restoration of damaged areas by artificial placement of sandfill and construction of seawalls, groins, and similar structures to prevent further damage and induce beach replenishment.

Beginning with a \$75,000 appropriation in 1824 for snagging and channel clearing in the Mississippi and Ohio Rivers, the program has grown over the 130 intervening years to a present scope of over 3,000 projects, including work in each of the 48 States, the District of Columbia, the territories and overseas possessions. In the development of the present program, the Congress has specified the areas to be investigated, prescribed the procedure to be followed, delineated policies and limits of Federal participation, individually authorized the projects and assigned to the Secretary

of the Army and the Chief of Engineers the responsibility for the engineering and economic planning, constructing, and administering the works and functions involved therein.

Status of the program. The Civil Works program grew in accordance with congressional authorizations until as of 30 June 1954 it included improvements completed, under construction, and not started, with a total estimated cost of \$18.1 billion. Although the Federal activity in providing navigation improvements dates back for more than a century, the major growth of the Civil Works program has occurred since 1928, when Congress adopted the project for flood control and navigation in the Alluvial Valley of the Mississippi, and since 1936 when Federal participation in flood control on a nationwide basis was first authorized by Congress.

This total program included certain projects which, because of changes in economic and physical conditions since authorization, were no longer required and had been classed as inactive, as well as other projects which required further study for determination of their status at the time. Projects in these two categories had a total estimated cost of \$3.6 billion, leaving an active program with a total estimated cost of \$14.5 billion. Since this program is subject to continuing review, the total cost involved will change from year to year.

Appropriations by Congress through 30 June 1954 for construction of these improvements, including \$325.6 million for fiscal year 1954, totaled about \$6.5 billion, leaving a balance of \$8 billion of appropriations required as of that date to complete the active program. This requirement included completion of work underway as well as projects not started.

The backlog of active authorized work consists of those projects for which there is current need and justification, such as the flood-control work needed to protect areas where there is danger to life or possibility of heavy economic loss, navigation improvements required by a rapidly expanding economy, and hydroelectric power developments related to flood control and navigation improvements. Other projects in the backlog which have a lower priority or require reexamination could be utilized as projects for relief of unemployment in the event of changed economic conditions. Most of the projects in both categories will require further detailed planning before they can be placed under construction. At the present time such planning is undertaken with funds specifically appropriated for that purpose by the Congress, prior to appropriation of construction funds.

Organization. The Civil Works mission of the Corps of Engineers is accomplished through a highly decentralized organization consistent with the wide geographic spread of authorized activities. This organization is comprised of 11 divisions which are subdivided into 41 districts completely covering the continental United States, Territories and overseas possessions. Boundaries between divisions and districts are selected so as to place, to the extent practicable, a river basin or appropriate coastal area within a single division and district, although in major basins this delineation is not always feasible.

The divisions and districts are administered by officers of the Corps of Engineers directing the work of some 25,000 civilians, exclusive of contractors' personnel, engaged in the planning, supervision of construction and operation of civil works. These field offices, together with certain additional division and district offices, also handle the military construction programs of the Army and the major portion of the Air Force program.

CHAPTER II

PROJECT CONSTRUCTION AND OPERATIONS PROGRESS

The Civil Works Program of the Corps of Engineers comprising navigation, flood control and multiple purpose projects, and various related activities, was diligently prosecuted during the fiscal year. Notable progress was made in carrying out project construction and placing additional works in useful operation. Construction was initiated on 9 new projects and on new features at 4 Mississippi River flood-control projects. Also, construction operations were carried out on 79 additional projects. Twenty-seven projects including features at 6 Mississippi River flood-control projects and at 12 multiple-purpose projects were placed in effective operation. A summary of project construction and operations progress by classes follows.

1. NAVIGATION

The present program for rivers and harbors as specifically authorized by the Congress includes projects located throughout the continental United States, Puerto Rico, Alaska, and the Hawaiian Islands. These projects are of various types; deep-draft harbors accommodating ocean-going vessels, shallow-draft channels for general small-boat navigation, inland waterways for commercial barge navigation, and the Great Lakes harbors and connecting waterways. With respect to the latter, the Buffalo

Table 1. Navigation Improvements Placed in Useful Operation During Fiscal Year 1954

Project	Date started	Date placed in useful operation	Nature of project
Baltimore Harbor, Md.....	1947.....	March 1954.....	Dredging.
Gowanus Creek Channel, N. Y..	March 1954..	April 1954.....	Dredging.
Intracoastal Waterway, Jacksonville to Miami, Fla.	1951.....	November 1953..	Dredging.
Monongahela River, Pa.....	1949.....	November 1953..	Reconstruction of lock 2.
Northeast Harbor, Maine.....	May 1954..	June 1954.....	Dredging.
Pearl River, La. and Miss.....	1938.....	November 1953..	Dredging and construction of locks and dams

In the fiscal year work was initiated on the following five navigation projects:

Table 2. Navigation Improvements Initiated During Fiscal Year 1954

Project	Date started	Scheduled completion date	Nature of project
Gowanus Creek Channel, N. Y.	March 1954	April 1954	Dredging.
Green River, Ky.	May 1954	1957	Reconstruction of locks 1 and 2.
Humboldt Harbor and Bay, Calif.	August 1953	1955	Dredging.
Norfolk Harbor (Crane Island Disposal Area), Va.	January 1954	1957	Dredging.
Northeast Harbor, Maine	May 1954	June 1954	Dredging.

The 12 navigation projects having major construction activity under way at the close of the fiscal year, exclusive of 3 new starts listed in the preceding table, are shown in the following table:

Table 3. Major Navigation Improvements Under Construction 30 June 1954

Project	Date started	Scheduled completion date	Nature of project
Arkansas River and tributaries, Ark.—Okla.	1950	Indefinite	Bank stabilization.
Black Warrior, Warrior, and Tombigbee Rivers, Ala.	1949	1955	Construction of Demopolis lock and dam.
Canaveral Harbor, Fla.	1950	Indefinite	Construction.
Cleveland Harbor, Ohio	1950	1958	Replace bridges and dredging.
Gulf Intracoastal Waterway (Galveston District), Tex.	1942	Indefinite	Dredging and construction.
Gulf Intracoastal Waterway (New Orleans District), La.	1942	Indefinite	Construction and dredging.
Mississippi River between Missouri River and Minneapolis, Minn.	1952	1957	Reconstruction of lock 19.
Mississippi River between Missouri River and Minneapolis, Minn.	1948	Indefinite	Construction of channel extension above St. Anthony Falls.
Missouri River, Kansas City to Mouth, Mo.	1912	Indefinite	Bank stabilization.
Missouri River, Kansas City to Sioux City, Iowa.	1928	Indefinite	Bank stabilization.
New York and New Jersey Channels, N. J.	1933	Indefinite	Dredging.
Schuylkill River above Fairmount Dam, Pa.	1952	1955	Dredging.

District was alerted late in the fiscal year on the possibility of reactivating plans to initiate construction of the St. Lawrence Seaway as authorized under Public Law 358, approved 13 May 1954, in the event the engineering and construction of this important waterway is assigned to the Corps of Engineers by the St. Lawrence Seaway Development Corporation. A complete review of the design of this project, as prepared by the Corps of Engineers in 1940-41, has been initiated.

Construction. During fiscal year 1954, major construction operations were carried out on 21 navigation projects, of which 6 were placed in useful operation as shown in table 1:

Maintenance. Maintenance and operation activities were conducted on 235 navigation projects during the fiscal year at a cost of \$64,300,522. Every effort consistent with budgetary requirements is made to maintain the navigation projects adequately to serve the reasonable requirements of commerce and navigation. In allocating the limited amount of funds being provided for project maintenance, it is the present policy to provide for only the essential needs of commerce and navigation at deep-draft harbors and major inland waterways, and for those relatively few channels serving areas where hardship to the locality would result from nonmaintenance. The maintenance program for dredging and structure repairs is held to the minimum, including restrictions in widths and depths of channel dredging, deferment of shallow-draft dredging, and deferment of repairs to structures on a calculated-risk concept.

The program for operation, maintenance and repair of locks, dams and bridges is limited to activities necessary to meet current needs of commercial navigation. The operation of locks is curtailed or suspended whenever commercial traffic on any canalized waterway or section thereof is found to have receded to the point where continued operation cannot be justified economically.

Inactive canalized waterways. The following 11 canalized waterways have been declared inactive, and the project structures are no longer operated because commercial navigation has receded to the point where little or no benefit to general commercial traffic exists.

During the year the operation and maintenance of the lock and dam on the Yamhill River, Oreg., was discontinued. Also, a bridge no longer used by general vehicular traffic at the Black Rock Channel, Buffalo, N. Y., was transferred to the city.

An agreement was consummated with private parties regarding the operation of Lock No. 1, Muskingum River, at their

Table 4. *Canalized Waterway Projects on Which Maintenance Has Been Discontinued*

Project	Structures
Big Sandy River, Ky.....	5 locks and dams.
Congaree River, S. C.....	1 lock and dam.
Green River, Ky.....	2 locks and dams (Nos. 5 and 6.)
Illinois and Mississippi Canal, Ill.....	34 locks and other structures.
Little Kanawha River, W. Va.....	5 locks and dams.
Muskingum River, Ohio.....	11 locks and dams.
Osage River, Mo.....	1 lock and dam.
Rough River, Ky.....	1 lock and dam.
Upper Fox River, Wis.....	9 locks, 7 dams.
Upper White River, Ark.....	3 locks and dams.
Yamhill River, Oreg.....	1 lock and dam.

expense. A previous agreement of similar nature for operation and maintenance of Dam No. 1, Big Sandy River, was continued in effect. Negotiations were in progress with the State of Wisconsin for the transfer of the Upper Fox River locks, dams and related property. The State has agreed to take over the properties, provided certain work is done on the structures prior to the transfer. Similar negotiations were continued with the State of Illinois in connection with the transfer of the Illinois and Mississippi Canal to State jurisdiction. It is reported that an amendment to the constitution of the State of Illinois will be voted upon in the November election to provide necessary authority for the State to accept the transfer of and maintain the Illinois-Mississippi Canal properties. Federal legislation will also be necessary authorizing the Corps of Engineers to transfer this canal and the other listed waterway projects to the States, or to convey them to others, and to accomplish necessary work on the project structures prior to such transfer or disposal of the real property.

2. GENERAL FLOOD CONTROL

The statutory backgrounds and broad descriptions of the authorized general flood-control program and the program for the Sacramento River, Calif., were fully discussed on pages 4 through 9 of part I, volume I of the Annual Report of the Chief of Engineers for 1953. Those remarks are still pertinent.

It is estimated that Federal flood-control works, including multiple-purpose projects in operation at the end of the fiscal year, have prevented flood losses aggregating over \$1,140 million. During the fiscal year these projects prevented flood losses estimated at over \$65 million.

Construction. During the year three flood-control projects, exclusive of multiple-purpose projects, were completed for beneficial use as follows:

Table 5. Flood-Control Projects Placed in Useful Operation During Fiscal Year 1954

Project	Date started	Date placed in useful operation	Nature of project
Ashland, Ky.....	1949	December 1953.....	Local protection.
Lavon Reservoir, Tex.....	1948	July 1953.....	Reservoir.
Pine Bluff, Ark.....	1953	April 1954.....	Local protection.

During the year work on the following 4 flood control projects, exclusive of multiple purpose projects, were initiated:

Table 6. Flood-Control Projects Initiated During Fiscal Year 1954

Project	Date started	Scheduled completion date	Nature of project
Havre, Mont.....	August 1953...	1956	Levees and diversion.
Pineville, Ky.....	July 1953.....	1956	Levees and walls.
Rio Grande Floodway, N. Mex...	April 1954.....	1956	Levees and channel works.
Swoyersville and Forty Fort, Pa...	July 1953.....	1958	Levees and walls.

The 47 major flood-control projects still under active construction at the close of fiscal year, exclusive of multiple-purpose projects and those projects initiated during the fiscal year as given in the preceding table, are as follows:

Table 7. Major Flood Control Projects Under Construction 30 June 1954

Project	Date started	Scheduled completion date	Nature of project
Adams, Mass.....	1950	1958	Local protection.
Belton Reservoir, Tex.....	1949	1955	Reservoir.
Benbrook Reservoir, Tex.....	1947	1955	Reservoir.
Chariton River, Iowa and Wis.....	1948	1960	Local protection.
Cherry Valley Reservoir, Calif.....	1950	1957	Reservoir.
Conemaugh River Reservoir, Pa.....	1949	1955	Reservoir.
Coralville Reservoir, Iowa.....	1949	1957	Reservoir.
Covington, Ky.....	1948	1955	Local protection.
Cumberland and Ridgeley, Md. and W. Va...	1948	1957	Local protection.
Dallas Floodway, Tex.....	1952	1957	Local protection.
Degonia and Fountain Bluff Drainage and Levee District, Ill.	1944	1955	Local protection.

Table 7. Major Flood Control Projects Under Construction 30 June 1954—(Con.)

Project	Date started	Scheduled completion date	Nature of project
Dillon Reservoir, Ohio.....	1946	(*)	Reservoir.
East St. Louis and vicinity, Ill.....	1937	1959	Local protection.
Farmington Reservoir, Calif.....	1952	1955	Reservoir.
Florida, Central and Southern, Fla.....	1950	1975	Local protection.
Garza-Little Elm Reservoir, Tex.....	1948	1956	Reservoir.
Harlan County Reservoir, Nebr.....	1946	1956	Reservoir.
Isabella Reservoir, Calif.....	1948	1956	Reservoir.
Kanopolis Reservoir, Kans.....	1940	1955	Reservoir.
Kansas City, Kans and Mo.....	1940	1959	Local protection.
Lavon Reservoir, Tex.....	1948	1955	Reservoir.
Los Angeles County Drainage Area (exclusive of Whittier Narrows Reservoir, Calif.)	1935	1983	Local protection.
Louisville, Ky.....	1947	1957	Local protection.
Lucky Peak Reservoir, Idaho.....	1949	1956	Reservoir.
Mansfield Hollow Reservoir, Conn.....	1949	1955	Reservoir.
Maysville, Ky.....	1949	1956	Local protection.
Memphis, Wolf River and Nonconnah Creek, Tenn.	1939	1959	Local protection.
Missouri River Agricultural Levees, Iowa, Kans., Mo. and Nebr.	1948	1976	Local protection.
Missouri River, Kenslers Bend to Sioux City, Iowa.	1946	1958	Local protection.
New Albany, Ind.....	1948	1955	Local protection.
Oklahoma City Floodway, Okla.....	1953	1958	Local protection.
Perry County Drainage and Levee Districts, Nos. 1, 2, and 3, Mo.	1937	1959	Local protection.
Pine Flat Reservoir, Calif.....	1947	1956	Reservoir.
Red River Levees and Bank Stabilizations below Denison Dam, Ark., La., and Tex.	1948	1963	Local protection.
Red River of the North, Minn. and N. Dak..	1950	1960	Local protection.
Rio Grande Floodway, N. Mex.....	1953	1957	Local protection.
Sacramento River, Calif.....	1918	1958	Local protection.
San Angelo Reservoir and Floodway, Tex...	1947	1955	Reservoir.
San Antonio Reservoir, Calif.....	1952	1956	Reservoir.
Sutton Reservoir, W. Va.....	1949	(*)	Reservoir.
Texarkana Reservoir, Tex.....	1948	1957	Reservoir.
Tuttle Creek Reservoir, Kans.....	1952	(*)	Reservoir.
Whittier Narrows Reservoir, Calif.....	1950	1957	Reservoir.
Wichita and Valley Center, Kans.....	1950	1958	Local protection.
Willamette River Bank Protection, Oreg...	1938	1961	Local protection.
Williamsport, Pa.....	1941	1956	Local protection.
Wood River Drainage and Levee District, Ill.	1947	1959	Local protection.

* Construction of this project has been suspended indefinitely.

Maintenance. Maintenance and operation activities were conducted on 101 flood-control projects during the fiscal year at a cost of \$4,070,500.

3. MULTIPLE-PURPOSE (POWER) PROJECTS

The importance of multiple-purpose projects in relation to the over-all activities of the Corps of Engineers continued to increase during the fiscal year as a result of the large construction program relating to these projects currently underway and the completion and placing in operation of primary-purpose features at several projects. These projects have been designed to serve primarily in the interest of navigation and/or flood control and the production of hydroelectric power, although frequently other benefits, such as irrigation, pollution abatement, water supply, and recreation are also realized.

The inclusion of power features in conjunction with other project features has often resulted in an enhancement of their economic value. Pertinent information on the power aspects of multiple-purpose projects is contained in section 4, Hydroelectric Power Production.

Construction. During the year four multiple-purpose projects were completed for full beneficial use as follows:

Table 8. *Multiple-purpose Projects Completed for Full Beneficial Use During Fiscal Year 1954*

Project	Date started	Date completed for beneficial use	Project primary purposes
Dale Hollow Reservoir, Tenn..	1951	November 1953	Flood control* and power.*
Philpott Reservoir, Va.	1948	September 1953	Flood control* and power.
St. Marys River (power plant), Mich.	1947	May 1954.....	Navigation* and power.*
Whitney Reservoir, Tex.	1947	July 1953.....	Flood control* and power.

* These primary purposes completed for beneficial use prior to fiscal year 1954.

During the year work was not initiated on any multiple-purpose projects.

There were 22 multiple-purpose projects under active construction at the end of the fiscal year. Of these, there were 12 projects with some or all primary-project features in useful operation at the end of the year. These projects are listed in table 9.

Table 9. Multiple-purpose Projects Under Construction with Some or All Primary Project Features in Useful Operation 30 June 1954

Project	Date started	Scheduled completion date	Features placed in operation during fiscal year 1954	Project primary purposes
Albeni Falls Reservoir, Idaho.	1951	1956	-----	Flood control,* navigation,* and power.
Blakely Mt. Reservoir, Ark.	1946	1955	-----	Flood control* and power.
Bull Shoals Reservoir, Ark. and Mo.	1946	1955	-----	Flood control* and power*.
Cheatham Lock and Dam, Tenn.	1950	1958	-----	Navigation* and power.
Clark Hill Reservoir, Ga. and S. C.	1946	1955	Additional power units; October, January and May.	Flood control,* navigation,* and power.
Detroit Reservoir, Oreg.	1946	1955	All power units; July, October and June.	Flood control,* navigation,* power and irrigation*.
Ft. Gibson Reservoir, Okla.	1942	1955	Additional power units; September.	Flood control* and power.
Ft. Randall Reservoir, S. Dak.	1947	1957	Initial power units; March and May—flood control (partial); July.	Flood control,* navigation, and power.
John H. Kerr Reservoir, Va. and N. C.	1946	1956	Additional power units; September, October and December.	Flood control* and power.
McNary Lock and Dam, Wash. and Oreg.	1947	1957	Initial power units; November, December, April and June.	Navigation,* power, and irrigation*.
Old Hickory Lock and Dam, Tenn.	1952	1958	Navigation lock; June.	Navigation and power.
Tenkiller Ferry Reservoir, Okla.	1947	1955	All power units; November and December.	Flood control* and power.

* Projects operated for these additional primary purposes at the beginning of and throughout fiscal year 1954.

Of the multiple-purpose projects under active construction at the end of the fiscal year, 10 projects had no primary-project features in operation. They are shown in table 10.

Table 10. Multiple-purpose Projects Under Construction and Not Operating 30 June 1954

Project	Date started	Scheduled completion date	Project primary purposes
Buford Reservoir, Ga.-----	1950	1958	Flood control, navigation, and power.
Chief Joseph Dam, Wash.-----	1949	1959	Power.
Folsom Reservoir, Calif.-----	1949	1957	Flood control, power, and irrigation.
Garrison Reservoir, N. Dak. and S. Dak.	1946	1958	Flood control, navigation, power, and irrigation.
Gavins Point Reservoir, Nebr. and S. Dak.	1952	1958	Flood control, navigation, power, and irrigation.
Jim Woodruff Lock and Dam, Fla. and Ga.	1947	1958	Navigation, and power.
Lookout Point Reservoir, Oreg.---	1947	1957	Flood control, navigation, power, and irrigation.
Oahe Reservoir, S. Dak.-----	1949	1963	Flood control, navigation, power, and irrigation.
Table Rock Reservoir, Ark. and Mo.	1953	1960	Flood control and power.
The Dallas Lock and Dam, Wash. and Oreg.	1952	1961	Navigation and power.

Maintenance. Operation and maintenance activities were conducted on 26 multiple-purpose projects during the fiscal year at a cost of \$8,318,800.

4. HYDROELECTRIC POWER PRODUCTION

Great strides were made during the fiscal year in accomplishing the program of constructing and operating hydroelectric power-production facilities authorized and operated in connection with navigation and flood control projects. The program goal for completion of construction and placing additional generating capacity in operation was fully realized.

At projects constructed by the Corps of Engineers, 9-billion kilowatt-hours were generated during the fiscal year, approximately 2 percent of the total production of the Nation's utility systems. The Corps of Engineers, with one minor exception, is not involved in the distribution and sale of the power produced at the projects, since under the various laws the power produced and available for sale is delivered to the control of the Secretary of the Interior for disposition at rates approved by the Federal Power Commission.

Present installed capacity. The power features of the projects placed in operation have produced substantial revenues which are deposited in the Treasury of the United States. Additional gener-

ating capacity of 803,250 kw representing 8 percent of the capacity added to the Nation's utility systems during the fiscal year was installed by the Corps of Engineers in 5 existing projects and 6 new projects as shown in the following table.

Table 11. *Generating Capacity Placed in Service During Fiscal Year 1954*

Project	Added capacity, kw	Project	Added capacity, kw
Clark Hill, Ga.-S. C.-----	120,000	McNary, Oreg.-Wash.*-----	280,000
Dale Hollow, Tenn.-----	18,000	Philpott, Va.*-----	14,000
Detroit, Oreg.*-----	118,000	St. Marys, Mich.-----	2,000
Fort Gibson, Okla.-----	11,250	Tenkiller Ferry, Okla.*-----	34,000
Fort Randall, S. Dak.*-----	80,000	Whitney, Tex.*-----	30,000
John H. Kerr, Va.-N. C.-----	96,000		
		Total-----	803,250

* Projects beginning initial operation during fiscal year.

Table 12. *Hydroelectric Stations in Operation 30 June 1954*

Project	Initial scheduled operation fiscal year	Name plate capacity		
		Existing installation (kilowatts)	Under construction (kilowatts)	Ultimate installation (kilowatts)
Allatoona, Ga.-----	1950	74,000	-----	110,000
Bonneville, Oreg. and Wash.-----	1938	518,400	-----	518,400
Bull Shoals, Ark. and Mo.-----	1953	160,000	-----	320,000
Center Hill, Tenn.-----	1951	135,000	-----	135,000
Clark Hill, Ga. and S. C.-----	1953	240,000	40,000	280,000
Dale Hollow, Tenn.-----	1949	54,000	-----	54,000
Denison, Okla. and Tex.-----	1945	70,000	-----	175,000
Detroit, Oreg.-----	1954	118,000	-----	118,000
Ft. Gibson, Okla.-----	1953	45,000	-----	67,500
Ft. Peck, Mont.-----	1944	85,000	-----	165,000
Ft. Randall, S. Dak.-----	1954	80,000	240,000	320,000
John H. Kerr, N. C. and Va.-----	1953	204,000	-----	204,000
McNary, Oreg. and Wash.-----	1954	280,000	700,000	980,000
Narrows, Ark.-----	1950	17,000	-----	25,500
Norfork, Ark. and Mo.-----	1944	70,000	-----	140,000
Philpott, Va.-----	1954	14,000	-----	14,000
St. Marys, Mich.-----	1952	18,400	-----	18,400
Tenkiller Ferry, Okla.-----	1954	34,000	-----	34,000
Whitney, Tex.-----	1954	30,000	-----	30,000
Wolf Creek, Ky.-----	1952	270,000	-----	270,000
Total, projects in operation-----		2,516,800	980,000	3,978,800

This large block (table 11) of additional generating capacity contributed greatly to alleviating power shortages, particularly in

the critically deficient northwest region which has recently been subject to power curtailment and where 398,000 kilowatts of additional capacity from the McNary and Detroit projects were made available to the Northwest Power Pool during the fiscal year. The additional generating capacity constructed and placed in operation increased the total generating capacity in service at the end of the fiscal year from projects built by the Corps of Engineers to 2,516,800 kilowatts located in 20 projects as shown in table 12. As of the end of the fiscal year, the generating capacity operated by the Corps of Engineers represented 2.7 percent of the total generating capacity and 11 percent of the hydroelectric generating capacity supplying utility systems in the United States.

Additional capacity under construction. At the end of the fiscal year, the Corps of Engineers had under construction additional generating capacity of 980,000 kilowatts at 3 operating projects as shown in table 12, and 3,224,000 kilowatts at 13 new projects, or a total of 4,204,000 kilowatts currently under construction as shown by the table which follows.

Table 13. *Hydroelectric Stations Under Construction 30 June 1954*

Project	Scheduled operation fiscal year	Name plate capacity		
		Existing installation (kilowatts)	Under construction (kilowatts)	Ultimate installation (kilowatts)
Albeni Falls, Idaho.....	1955	-----	42,600	42,600
Blakely Mountain, Ark.....	1955	-----	75,000	75,000
Buford, Ga.....	1958	-----	86,000	86,000
Cheatham, Tenn.....	1957	-----	36,000	36,000
Chief Joseph, Wash.....	1956	-----	1,024,000	1,280,000
Garrison, N. Dak.....	1955	-----	240,000	400,000
Gavins Point, Nebr. and S. Dak.....	1957	-----	100,000	100,000
Jim Woodruff, Fla.....	1956	-----	30,000	30,000
Lookout Point, Oreg.....	1955	-----	129,000	129,000
Oahe, S. Dak. and N. Dak.....	1961	-----	170,000	425,000
Old Hickory, Tenn.....	1956	-----	100,000	100,000
Table Rock, Ark. and Mo.....	1960	-----	100,000	200,000
The Dalles, Oreg. and Wash.....	1958	-----	1,092,000	1,248,000
Total projects under construction.	-----	-----	3,224,000	4,151,600
Total projects in operation, (table 12).	-----	2,516,800	980,000	3,978,800
Total projects operating and under construction.	-----	2,516,800	4,204,000	8,130,400

The projects operating and under construction will have an ultimate installed capacity of 8,130,400 kilowatts, of which, under present schedules, 4,865,400 kilowatts will be available for service by 30 June 1957. Chart I indicates the rapid increase in installed capacity.

HYDRO-POWER PRODUCTION CAPACITY OPERATING AND SCHEDULED

MILLION
KILOWATTS

MILLION
KILOWATTS

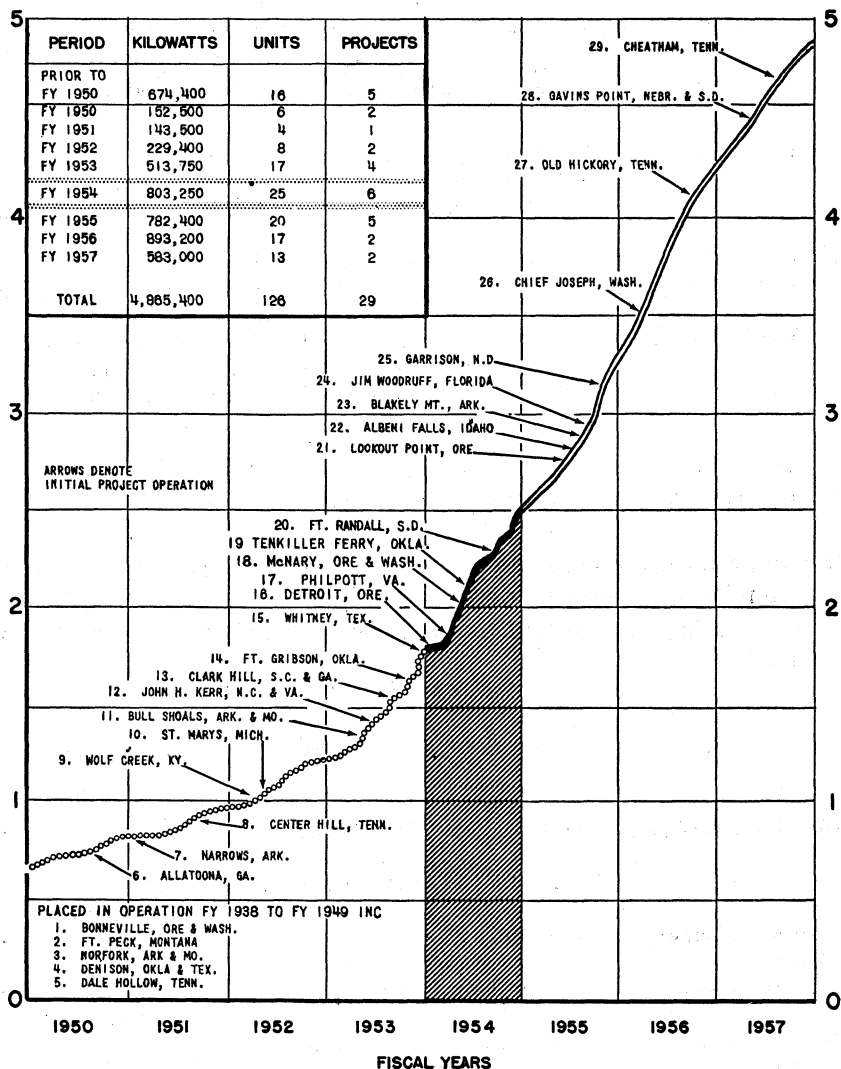


CHART I.

5. MISSISSIPPI RIVER FLOOD CONTROL

The flood-control project for the alluvial valley of the Mississippi River as authorized by the act approved 15 May 1928, and subsequently amended, was described on pages 10 and 11 of part I, volume I of the Annual Report of the Chief of Engineers for 1953. The total authorization for the project at the end of the fiscal year was \$1,292,748,500, of which \$849,771,400 had been appropriated and \$846,092,400 expended.

Construction. During the year the following six major items of construction were placed in useful operation.

Table 14. Work Placed In Useful Operation During Fiscal Year 1954

Project	Date started	Date placed in useful operation	Nature of project work
Atchafalaya Basin, La.	1953	April 1954.....	Tiger Island levee and floodwall.
	1952	June 1954.....	Bayou Boeuf Lock.
	1953	June 1954.....	Wax Lake west drainage structure.
Des Arc, Ark.....	1953	February 1954..	Local protection.
Greenwood, Miss.....	1952	September 1953	Lee and Wilson Sts. pumping stations.
Grenada Dam, Miss...	1951	January 1954...	Outlet works and closure section.
	1948	April 1954.....	I. C. R. R. relocation.
	1951	March 1954.....	Miss. and Skuna Valley R. R. relocation.
	1951	September 1953	Relocation of Highway No. 7.
New Orleans, La.....	1952	July 1953.....	Dumaine Street floodwall.
Yazoo City, Miss.....	1953	September 1953	Jonestown cutoff.

In addition, 31 miles of main line levees, 58 miles of secondary levees, and 23 miles of revetment were constructed.

During the year, work on the following features of 4 projects was initiated:

Table 15. Work Commenced During Fiscal Year 1954

Project	Date started	Scheduled completion date	Nature of project work
Atchafalaya Basin, La.	June 1954.....	April 1955.....	Bayou Yokely Pumping Station.
	January 1954....	October 1955....	Wax Lake East Drainage Structure.
Morganza Floodway, La.	August 1953....	June 1955.....	Highway 30—Surfacing.
St. Francis Basin, Ark.	February 1954..	After 1961.....	Madison-Marianna Floodway.
Tensas Basin, Ark. and La.	August 1953....	June 1955.....	Reach 1, Boeuf River.

Condition of over-all project. At the end of the fiscal year the project as a whole from Cairo, Ill., to the Gulf of Mexico was in very satisfactory condition, although some 34 percent of the work remains to be accomplished. A total of 1,277 miles of main-line levees and of 886 miles of secondary levees have been constructed. Reservoirs at Wappapello, Arkabutla, Sardis Enid, and Grenada have been completed. The floodways at Bonnet Carre, Morganza, West Atchafalaya and the Atchafalaya River will permit diversion of over 1,750,000 cubic feet per second of flood flow and leave 1,250,000 cubic feet per second to pass New Orleans. Conservative estimates place the annual damage prevented by these completed works at \$217,000,000, and the total damages prevented since the adoption of the project at more than \$5 billion. This amounts to approximately \$5 of savings to every dollar of project funds so far appropriated.

Prevention of diversion of Old River. A study conducted by the Mississippi River Commission in 1951 concluded that the Mississippi River, if left alone, would adopt the channel of the Atchafalaya River, a much shorter route to the Gulf of Mexico. A report completed by the Commission in 1954, and concurred in by the Chief of Engineers, recommends that the existing project for the lower Mississippi River be amended to provide for the control of flows from the Mississippi River into the Atchafalaya by means of mechanically operated control structures on the right bank of the Mississippi. The estimated cost of the work is \$47,000,000 (exclusive of a navigation lock which will be reported on later). At the close of the fiscal year, this report bearing House Document No. 478, 83rd Congress, was under consideration by the Congress.

6. NIAGARA REMEDIAL WORKS

The 1950 Niagara Water Treaty with Canada permits additional diversions of water for greatly increased power developments in the United States and Canada at the falls, and also expresses the primary obligation of the two Governments to preserve and enhance the scenic beauty of Niagara Falls and River. Pursuant to this obligation, a project was developed and approved by the two Governments for remedial works necessary to produce an unbroken crestline at the falls. The work consists of a control structure extending about 1,550 feet from the Canadian shore to a point about 1 mile above the Horseshoe Falls, and for excavations and fills on both flanks of the Horseshoe Falls, at an estimated total cost of \$17,500,000 to be divided equally between the two Governments. In 1954, with an appro-

priation of \$1,500,000, the Corps of Engineers, as the designated construction agency for the Government of the United States, initiated its portion of the work consisting of excavation and fills generally on the United States side of the international boundary. The Ontario Hydroelectric Power Commission is performing the work in Canada, consisting of the control structures and certain excavation on the Canadian side of the boundary.

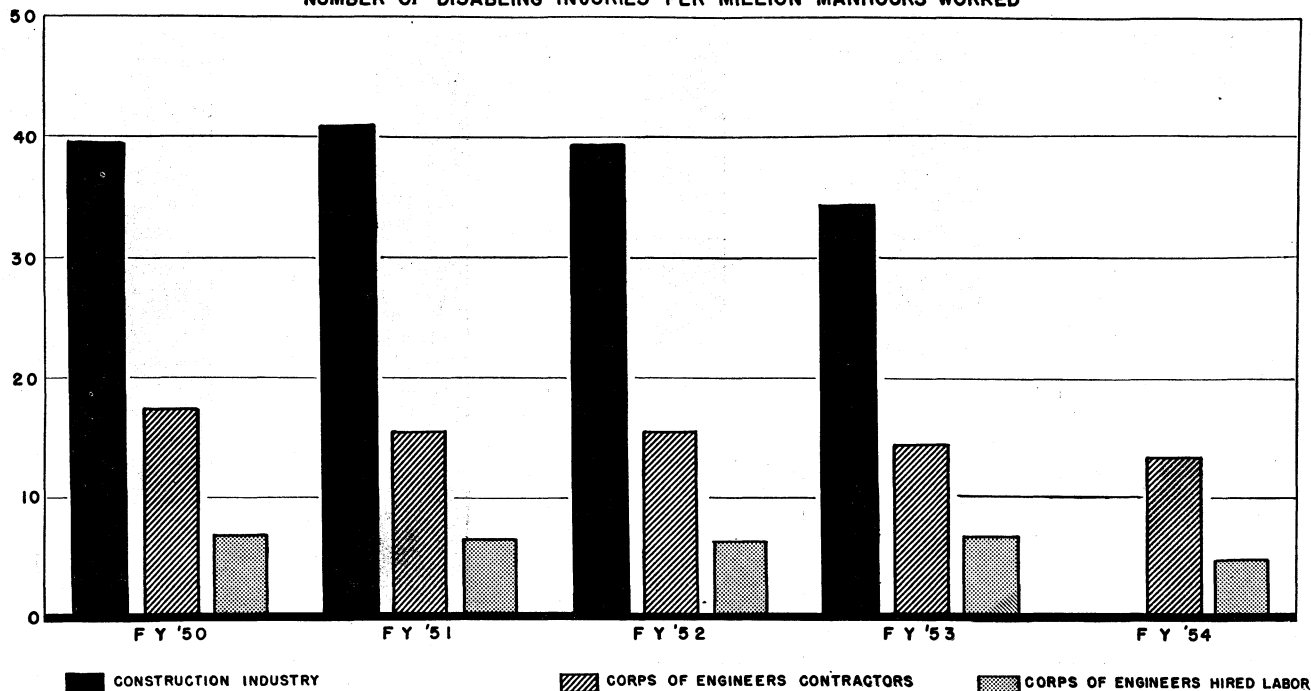
7. GENERAL OPERATIONS

Work done by contract. The Corps of Engineers for many years has consistently adhered to its policy of having construction work done by contractors in all cases except when the best interests of the United States require hired labor operations. This past year was no exception to the policy. In fact, 94 percent of all construction work was performed by contract and only 6 percent by Government plant and hired labor. In recent years the amount of construction by hired labor has remained at this low percentage. A larger percentage of the maintenance work has been performed by hired labor. The hired labor work on construction projects has been limited to such types of operations as dredging in exposed harbor entrances by Government-owned hopper dredge, the construction of erosion control and levee revetment works, and grouting operations. The nature of such work does not readily lend itself for advertising and performance by contract.

Accident prevention. The attention which the Corps of Engineers has paid over the years to the prevention of accidents at all its construction and maintenance operations, whether by hired labor or contract, has paid sizable dividends in the improved welfare of construction workers, decreased loss of time on works, decreased costs and increased efficiency. Chart II shows the continued improvement in the disabling injury frequency rate on civil-works projects for Government and contractors' employees and the rate for the construction industry in general.

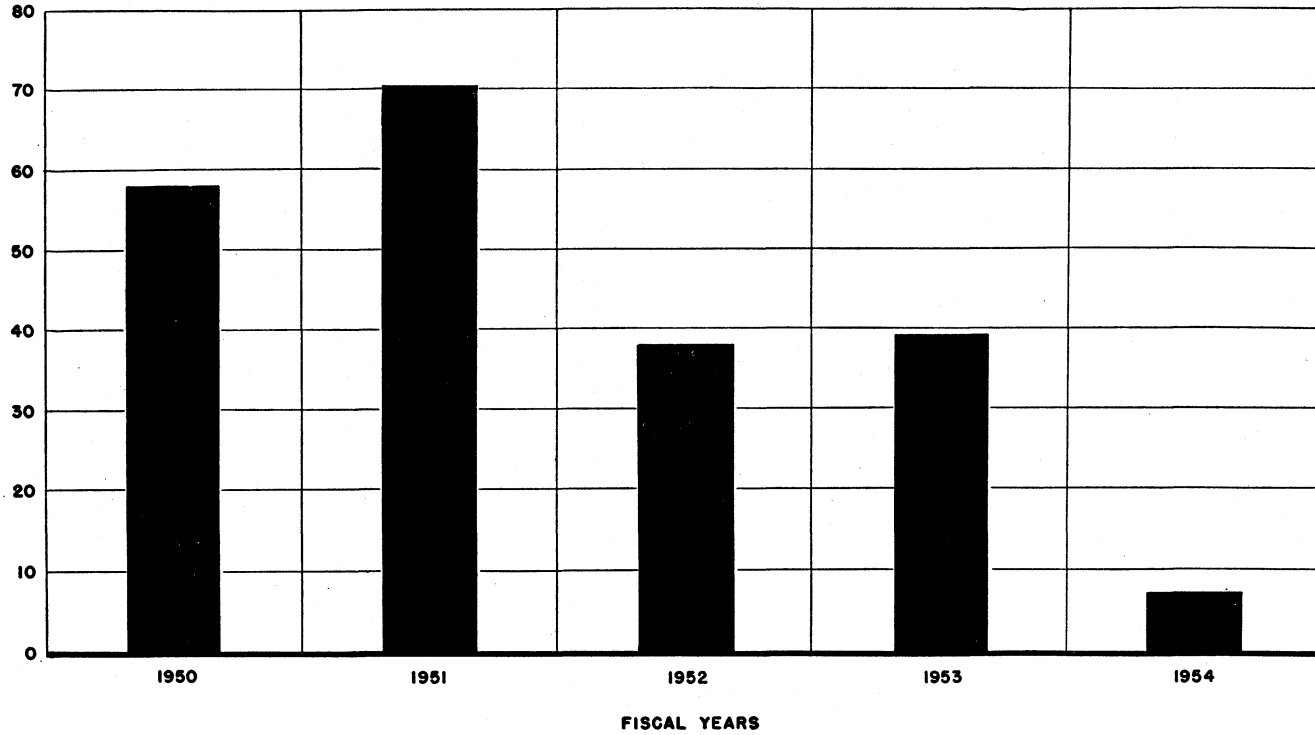
Fire prevention. The reduction in Corps of Engineers fire damage to an amount less than one-fifth of the average for the preceding years, as shown on chart III, reflects emphasis on fire prevention through improved planning and design of structures, equipment, and operation. Also, credit must be given to an intensified program of over-all fire prevention and protection which includes indoctrination of personnel in preventive measures and the provision of more adequate fire-fighting equipment.

DISABLING INJURY FREQUENCY RATE
NUMBER OF DISABLING INJURIES PER MILLION MANHOURS WORKED



NOTE: The rate for the construction industry for the year 1954 is not available.

FIRE DAMAGE

DOLLARS - MILLIONS
CHART III.

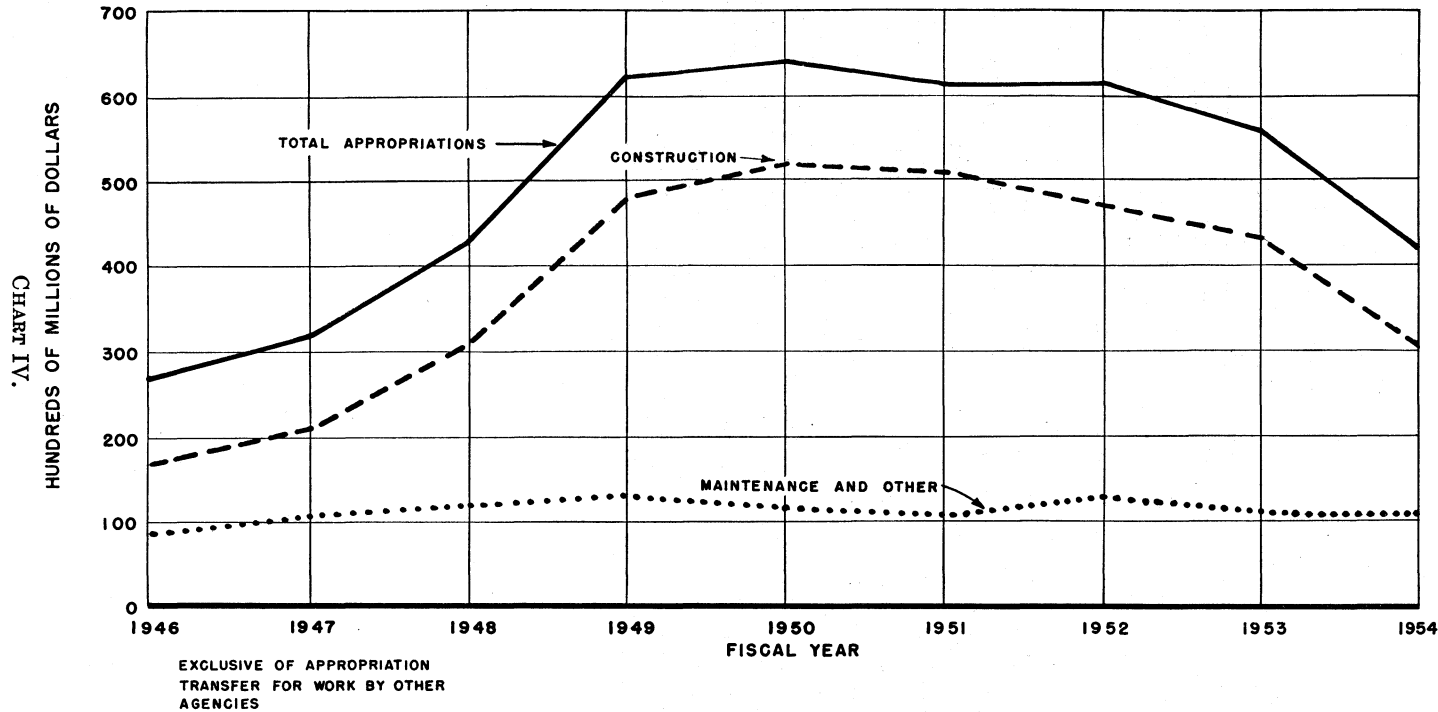
CHAPTER III

FUNDING TRENDS

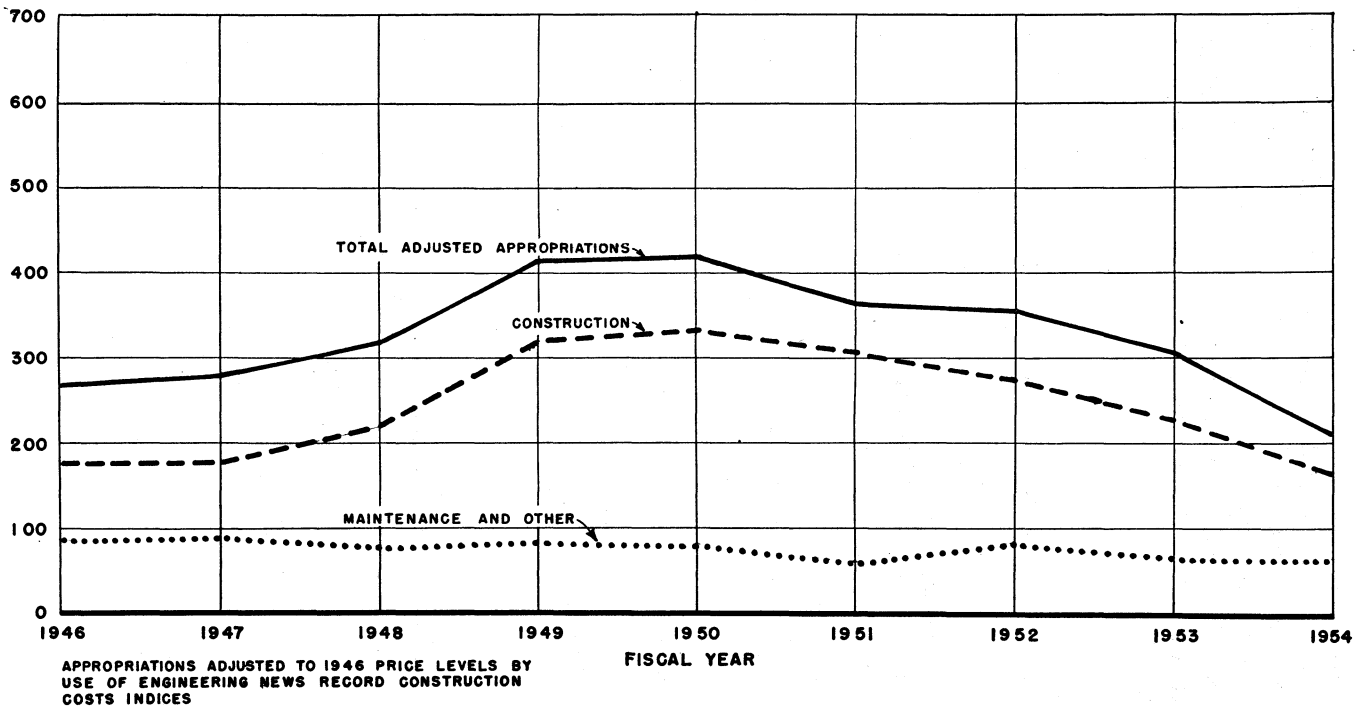
Funds available for work. Fiscal year 1954 funds appropriated for all civil-works activities of the Corps of Engineers amounted to \$424,231,600. Individual appropriations are detailed in table 18, chapter VIII. Table 21, chapter VIII, shows the status of the funds advanced by local interests for navigation and flood-control improvements.

Annual appropriation. Chart IV indicates the fluctuations in annual appropriations since 1946 for civil-works functions and shows the downward trend since 1950, which, if continued, would increase the lag between water-resource development and the growing requirements to fulfill the expanding needs of the nation. Chart V shows actual appropriations adjusted to reflect rising construction costs since World War II. Although the actual appropriations for 1954 represent a 57-percent increase over 1946, application of the Engineering News Record's cost-of-construction index to the 1954 appropriation shows a decrease of 18 percent in the amount of work which the appropriation could produce as compared to the materially lower appropriation of a decade ago. This indication is offset in part by a continuing improvement in construction methods and procedures.

ACTUAL APPROPRIATIONS—CIVIL WORKS FUNCTIONS F Y 1946—1954 INCL.



ADJUSTED APPROPRIATIONS - CIVIL WORKS FUNCTIONS F Y 1946 - 1954 INCL



Expenditures (costs). During the fiscal year 1954, expenditures (costs) amounted to \$528,462,000, of which \$422,432,000 was for construction, general, and \$106,030,000 for all other activities, except those funded by contributions, advances and collections from local sources and transfers from other agencies. Chart VI shows the comparative expenditure (cost) data since 1950.

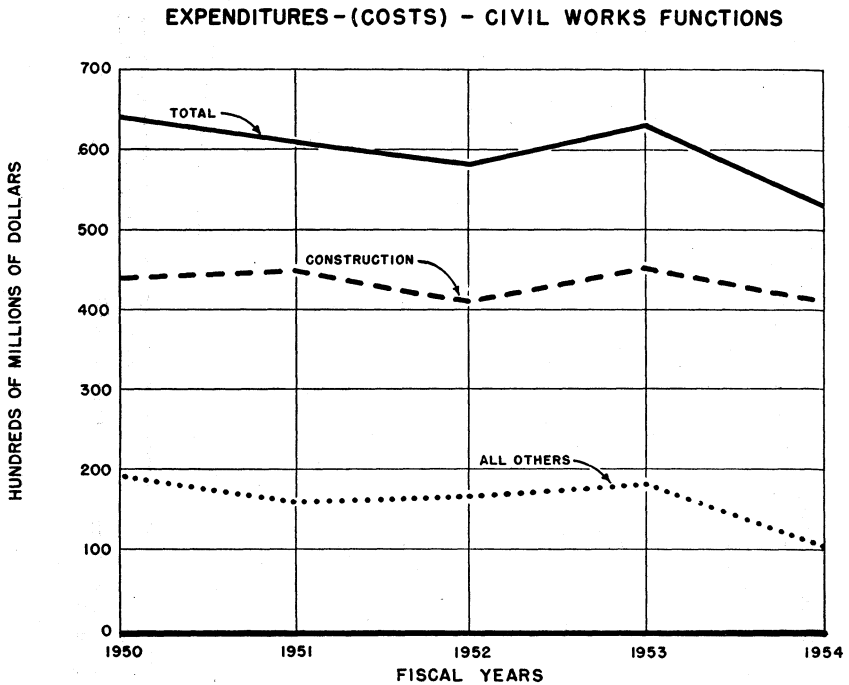


CHART VI.

CHAPTER IV

CURRENT PROJECT PLANNING AND DEVELOPMENT

1. PROGRAM POLICY MATTERS

Various program policies and procedures were reviewed, improved, and modified. Those under consideration during the year having significant importance to the conduct of the program are discussed in the following paragraphs:

Real estate acquisition. The Secretaries of the Army and the Interior adopted a major revision of real-estate acquisition policy designed to reduce the amount of land acquired in fee at reservoir projects. The Corps of Engineers has taken necessary action to place this revised policy in effect.

Partnership arrangements for power. A number of proposals were introduced before Congress which contemplated the development of power by non-Federal interests in connection with flood-control and navigation projects under cooperative arrangements with the Federal Government. These proposals were carefully reviewed and the official comments of the Department of the Army, requested by congressional committees, were prepared. Laws were enacted or under consideration providing for the development by non-Federal interests of power at the Priest Rapids project (Columbia River, Wash.), the Coosa River development (Ala.), and the Markham Ferry project (Grand River, Okla.). In addition, legislation was under consideration which would authorize non-Federal participation in the cost of the Canyon project, Tex., for construction, operation, and maintenance of water conservation, stream-flow regulation, and development of hydroelectric power at such time as a power installation may be constructed.

Cost allocations. Representatives of the Corps of Engineers conferred with the Department of Interior and the Federal Power Commission with a view to the development of mutually acceptable practices in allocating the costs of multiple-purpose projects with power. These discussions culminated in an agreement among the three agencies concerned, under which all agencies recognize that each project purpose should share equitably in the savings resulting from multiple-purpose construction and should carry as a minimum its separable costs, or cost traceable to its inclusion in the multiple-purpose project. The agreement also recognizes a method of allocation, known as the "separable costs-

remaining benefits method" as preferable for general application. Reviews were undertaken to revise allocations of costs for Corps of Engineers' projects pursuant to this agreement. Methods of determining economic feasibility were modified to include taking into account on the cost side of the ledger the amount of taxes foregone when power is developed as a Federal project rather than by private interests.

Fish and wildlife. An agreement was worked out with the Fish and Wildlife Service and approved by the Secretary of the Army and the Secretary of the Interior for the purpose of promoting sound planning on fish and wildlife matters related to river-basin projects of the Corps of Engineers. The agreement sets forth uniform procedures for the incorporation of recommendations of the Fish and Wildlife Service, as well as the State Fish and Game Departments, in project reports submitted to Congress by the Corps of Engineers. General plans will be developed jointly by the two Federal agencies and the appropriate State agency for all project lands and waters where management for fish and wildlife purposes is proposed. The agreement provides, among other things, that both gains and losses to wildlife will be considered and that recommendations of the Fish and Wildlife Service will be as specific as possible as to purpose, costs, results expected, and related matters. The agreement further provides, as a general policy, that leases of project lands for agricultural purposes shall specify that the lands shall be open for public hunting and fishing. The agreement is established, in the public interest, to provide for the best uses of natural resources available for fish and wildlife purposes and to prevent undue losses to fish and wildlife through project construction.

Interagency Committee on water resources. On 26 May 1954, the President approved an "Interagency Agreement on Coordination of Water and Related Land Resources Activities" which contemplated the establishment of the "Interagency Committee on Water Resources" to replace the Federal Interagency River Basin Committee. The new committee is composed of the Assistant Secretaries of the Departments of Agriculture, Army, Commerce, Interior and Labor, the Surgeon General of the Department of Health, Education and Welfare, and the Chairman of the Federal Power Commission. It is the responsibility of the committee to establish means and procedures to promote coordination of the water and related land resources activities of the member agencies; to undertake resolution of interagency differences to the extent possible under existing law and administration policy; and to suggest to the President changes in existing law or ad-

ministration policy which would promote coordination and eliminate or reduce interagency differences. In addition, the committee was directed by the President to assist the Cabinet Committee on Water Resources Policy, composed of the Secretaries of Interior, Defense, and Agriculture, which the President has directed to undertake a review of all aspects of water-resources policy.

2. EXAMINATIONS AND SURVEYS

The investigation program of the Corps of Engineers, which provides the basis for sound development of the Nation's water resources as administered by the Corps of Engineers, was continued consistent with funds made available by the Congress for that purpose. During the fiscal year, the survey program was carried forward as indicated in the following tabulation:

Table 16. Summary of Reports Processed During Fiscal Year 1954 and Status at End of Year

Processed during year	Number
Reports transmitted to Congress.....	84
Reports transmitted to Bureau of the Budget.....	75
Reports transmitted to State and Federal agencies.....	78
Reports transmitted to River and Harbor and Beach Erosion Boards..	94
Total actions.....	331
<i>Status as of 30 June 1954</i>	
Favorable reports before Congress.....	158
Reports in process in Office, Chief of Engineers.....	64
Active reports in field offices.....	85
Special studies active in field offices.....	3
Inactive reports in field offices.....	804
Special studies inactive in field offices.....	1
Total.....	1,115

The Public Works Committees of Congress adopted during the year 60 resolutions requesting review of previous reports on proposed river and harbor and flood-control improvements. These authorities are included in the above tabulation.

Omnibus authorization bill. At the close of the fiscal year, the Congress had under consideration an omnibus rivers and harbors and flood-control authorization bill. The bill would authorize many projects recommended for construction in the survey reports shown as transmitted to Congress in the foregoing table, in addition to other favorable reports submitted to the Congress prior to

fiscal year 1954. Upon enactment of this legislation, additional investigations will also be added to the existing survey program.

Current survey program. In view of the limited funds made available in recent years for conducting the survey-report program, only a relatively few studies have been completed compared with the total number authorized. In order to prosecute a larger number of the outstanding investigations with the limited appropriations made available for that purpose, studies are being made with a view to preparing surveys more expeditiously and at less cost. Some of the noteworthy features of the current-survey program include the following which indicate the attention being given by the Corps of Engineers and other agencies in the water-resources field to the integration of programs.

New England-New York Interagency Committee. A provision in the Flood Control Act of 1950 authorized a comprehensive investigation covering all water and land-resource development in the New England States. An interagency committee was formed, in accordance with the desires of the President, to survey the water and land resources of the New England-New York region. Membership consists of one representative each of the Departments of Agriculture, Army, Commerce, Interior, Labor, and Health, Education and Welfare, and the Federal Power Commission, with the Department of the Army the chairman agency. The survey is being conducted in cooperation with the Governors of the seven States participating in the survey. At the close of the fiscal year, work was continuing by the interagency work groups in drafting section of the NENYIAC report dealing with individual basins. The scheduled completion date for this survey report is 30 June 1955.

Arkansas-White-Red Basins Interagency Committee. Congress, in the Flood Control Act of 1950 also authorized a comprehensive investigation covering all streams in the Arkansas, White, and Red River Basins. In accordance with the desires of the President, an interagency committee was organized in order that all agencies, both Federal and State, concerned with water-resources development may participate. The Department of the Army is the chairman agency. At the close of the fiscal year, the interagency work groups were drafting sections of the AWR report. The completion date for this report is established as 30 June 1955.

Survey of the San Francisco Bay area. A comprehensive preliminary examination and survey of the San Francisco Bay area was authorized by the Flood Control Act of 1950. The preliminary examination has been completed and a survey assigned to the reporting officers. The study will include consideration of

dikes or barriers across the northern or southern halves of the bay for fresh water impoundment and also as causeways or bridges. The study will include consideration of navigation requirements, traffic needs, reclamation of marginal lands, water supply in deficient areas, salt-water intrusion, and other water problems in the bay area.

Great Lakes water levels survey. A comprehensive survey is being made of the feasibility of regulating the levels of the Great Lakes to reduce damages from cyclic high-lake levels and to improve navigation use and hydroelectric-power production. This study, authorized by resolution adopted 26 June 1952 by the Committee on Public Works, House of Representatives, is being made in close cooperation with the affected lakes States. Completion will be dependent upon future appropriations. Study of the remaining local flood problems along the lake shores is being held in abeyance pending a definitive statement by Congress on the extent of Federal interest in such problems.

3. BOARD OF ENGINEERS FOR RIVERS AND HARBORS

As required by law, the Board of Engineers for Rivers and Harbors completed during the fiscal year its review of reports made in response to 128 congressional authorizations for studies pertaining to proposed navigation and flood-control improvements. It held 8 meetings, of from 1 to 3 days' duration, conducted public hearings, and made a field inspection. Commencing in October 1953, the Board opened its meetings to the public, conducting in open session all deliberations and discussion in order that interested parties can be fully informed on the basis on which the Board's decisions are made. The Board considered 91 preliminary examination and survey reports on proposed projects estimated to cost some \$950 million. In addition, the Board reviewed 39 reports on water-resources development prepared by other Federal agencies. It prepared a number of reports on general subjects such as policies and procedures and waterways economics.

4. BEACH EROSION BOARD

The Beach Erosion Board completed during the year action on six studies made, in cooperation with various State agencies, as provided for by law, to devise effective means of preventing erosion of coastal and Great Lakes shores by waves and currents. Applications of State agencies for four other such studies were approved. The Board also completed its review of 10 reports on the beach erosion aspects of navigation improvements. General

investigations of means of protecting shores against erosion have been continued, with the publication of 20 technical papers. In addition, the Board worked on numerous research projects and miscellaneous reports for other governmental agencies, and conducted a 3 weeks' course on wave phenomena for interested Corps of Engineers' personnel and technical representatives of State and Canadian Government agencies.

5. ADVANCE ENGINEERING AND DESIGN

During the preliminary phase of preparing authorized projects for construction, features thereof are developed, firm estimates of costs are prepared, orderly construction schedules are worked out and necessary detailed information is readied for coordination with local interests, States, and other agencies. A backlog of projects ready for initiation of construction is in preparation to allow an expansion of the civil-works construction program at such time as the national budgetary policy permits, at the same time assuring the development of a sound and well-balanced program consistent with the Nation's needs in the fields of navigation, flood control, and allied water uses.

The sum of \$1,900,000 was appropriated in fiscal year 1954 for advance engineering and design. With these funds and funds carried over from prior years, during fiscal year 1954 the Corps of Engineers prosecuted planning on 44 projects, consisting of 8 navigation, 26 flood control, and 10 multiple-purpose projects. Planning on 15 of these projects was advanced to the stage where construction could be readily initiated. Funds in the amount of \$2,821,000, representing approximately 90 percent of the total available for this activity, were obligated during the fiscal year.

In addition to planning work on projects, the Corps of Engineers continued its program of investigating the means of improving design and construction procedures. The accomplishments and economies effected in this field of activity are set out under the paragraphs headed *Civil-works investigations program* contained in chapter VII.

6. COLLECTION AND STUDY OF BASIC DATA

In the planning, development and operation of the Corps' river-basin projects, the collection and study of basic data is indispensable. It includes (1) those cooperative activities performed by other Federal agencies for which funds are provided by the Corps of Engineers for the basic program of observing and compiling data on stream flow, rainfall, and fish and wildlife re-

sources; and (2) those miscellaneous hydrological and other technical, physical, and economic data required for keeping up-to-date information essential to properly evaluate the continuing and recurring water-resource development problems. Specific phases of this activity during the fiscal year included the following:

Hydrologic data in Nicaragua. The River and Harbor Act of 20 June 1938 specifically authorized the Corps of Engineers to continue the collection of hydrologic data concerning the proposed canal in Nicaragua. The collection of such data was continued by the Inter-American Geodetic Survey with funds provided by the Corps of Engineers. Basic data were obtained at 16 stations and water surface elevations were collected at 2 lakes in the vicinity of the proposed canal. These data will become a part of the series of annual reports on hydrologic data that have been prepared by the Nicaraguan Canal Survey for the past 20 years.

Cooperative programs with the U. S. Weather Bureau. Operation of a network of rain gages, known as the Hydroclimatic Network, was continued by the Weather Bureau at the request of the Corps of Engineers. Funds in the amount of \$338,000 were transferred to the Weather Bureau for operation of the network during the fiscal year 1954. At the end of June 1954, there was a total of 2,876 stations, 2,332 recording, and 544 non-recording in the program. Data from these stations are published monthly in the Weather Bureau publication, "Hourly Precipitation Data."

The hydrometeorological section in the Weather Bureau was continued during the fiscal year at the request of the Corps of Engineers to review the meteorological aspects of the storm-study program and to develop theoretical concepts and practical techniques for use in engineering design. Funds in the amount of \$93,000 were made available to the Weather Bureau to finance the section during the fiscal year 1954. The principal activities during the year were the publication of two reports on hurricane winds over Lake Okeechobee, Fla.; a preliminary estimate of probable maximum precipitation for the Gila River Basin in Arizona; a set of charts presenting the seasonal variation of the standard project storm for 200 and 1,000 square miles for 24 hours as well as preliminary charts for large areas and long durations, studies of seasonal variation of a number of selected meteorological parameters, partial reexamination of meteorological factors pertinent to floods on the Lower Mississippi River, and other studies involving meteorological aspects of engineering problems.

River and rainfall reporting networks, currently totaling 39 in number, were also continued at the request of the Corps of Engineers in order that frequent reports of river and rainfall data may be available as required by the District Engineers for flood-control operation and flood-forecasting purposes. Funds in the amount of \$82,413 were transferred to the Weather Bureau for this program during the fiscal year 1954.

Stream gaging program with U. S. Geological Survey. The Geological Survey continued the cooperative program of constructing, maintaining, and operating stream-gaging stations required in connection with Corps of Engineers' activities. The sum of \$831,675 was transferred to the Geological Survey for operation of approximately 1,900 stations under this program during the fiscal year 1954.

CHAPTER V

COLLATERAL PROGRAM BENEFITS

1. WATER SUPPLY-DROUGHT RELIEF

When it was determined that the possibility existed of continuation of general drought conditions in the United States during 1954, the division and district engineers were authorized to increase conservation storage in reservoir projects by use of flood-control storage where feasible. Drought prevailed over much of the central and southwestern United States for most of the period, with stream flow lower than it had been in more than a decade on many streams. Storage for municipal and industrial use became critical in some areas.

The operation of Corps of Engineers reservoirs relieved deficient stream flows at many localities. On the Missouri River the release of stored water from the Fort Peck Reservoir augmented flows during periods when natural river conditions were inadequate for navigation, municipal water supply, and pollution abatement. This reservoir made a major contribution to stream flows throughout the 1,867-mile reach from Fort Peck Reservoir to the mouth of the Missouri River. During the summer and fall of 1953, had the reservoir contribution not been available, flows would have been as low as 9,000 cubic feet per second, or about 4,000 cubic feet per second below that required for stream sanitation at Kansas City. Reservoir releases added from 14,000 to 29,000 cubic feet per second to the natural river flow. This timely augmentation increased the water supply available for consumptive uses, and provided flows well above those required for sanitation purposes.

Emergency water supply releases were also made from Canton Reservoir for Oklahoma City, Okla.; Denison Dam (Lake Texoma) for Denison, Tex.; Delaware Reservoir for Columbus, Ohio; and other reservoirs. This adjustment in reservoir operation was permitted as an emergency measure only where specific benefits would result and where no damage would be caused in the reservoir areas.

2. PUBLIC USE OF PROJECT AREAS

Public recreational use at the civil-works projects of the Corps of Engineers has shown a substantial increase in the past several years. The total attendance of 41,000,000 in the calendar year

1953 compares with 29,500,000 in 1952, and 21,000,000 during 1951.

Progress is being made in enlisting the participation of State, county, and local governmental agencies in the management of civil-works project lands for public park and recreation purposes. In some instances, these agencies have accepted the responsibility of managing entire reservoirs for such purposes. The concessionaires at the projects are performing a public service in providing facilities to accommodate the public so that it may enjoy the collateral benefits of the projects. The projects listed below had the highest attendance during 1953.

Table 17. Attendance at Project Areas, Calendar Year 1953

Project	Attendance
Lake Texoma (Denison Dam), Okla.-Tex.....	3,990,000
Upper Mississippi Navigation Project (Pools Nos. 1 to 26).....	2,710,000
Lake Cumberland (Wolf Creek Dam), Ky.....	1,940,000
Whitney Reservoir, Tex.....	1,680,000
Hansen Reservoir, Calif.....	1,560,000
Clark Hill Reservoir, S. C.-Ga.....	1,290,000
Fort Gibson Reservoir, Okla.....	1,290,000
Allatoona Reservoir, Ga.....	1,070,000
John H. Kerr Reservoir, Va.-N. C.....	1,010,000
Dale Hollow Reservoir, Tenn.-Ky.....	980,000

CHAPTER VI

OTHER CIVIL-WORKS ACTIVITIES

1. FLOOD FIGHTING AND OTHER EMERGENCY OPERATIONS

The Corps of Engineers during the year participated in and supplemented the efforts of local interests in flood-fighting operations in various areas and at many localities throughout the country. These flood-emergency activities, involving rescue work and the repair, restoration, or maintenance of flood-control work threatened or destroyed by flood, are carried on under the Corps' statutory authority. In addition, disaster assistance was furnished to States and local governments in accordance with the procedures established pursuant to Public Law 875, 81st Congress. The most noteworthy emergency operations during the fiscal year are described in the following paragraphs.

Flood of May 1954, Kootenai River Basin. Snow survey measurements made on 1 May 1954 for key stations in the Kootenai River Basin indicated that the water content of the snow pack was the greatest ever recorded for that time of year. In view of the potential flood conditions then existing, the district engineer at Seattle, Wash., informed the State and local authorities and the general public as to existing potential flood conditions. Corps of Engineers installations were manned on an emergency basis. All available personnel, equipment, and supplies were mobilized to assist State and local authorities.

At Bonners Ferry, Idaho, a large area of valuable agricultural land was subject to flooding. No levee in the valley was assured of withstanding the predicted flood crest. The division engineer, North Pacific Division, maintained close liaison with the commanding general, Sixth Army, and alerted him of the possibility the Governor of the State might request Federal aid in flood fighting. When it became apparent that a major flood was imminent, the Governor of Idaho declared an emergency and requested Federal aid in the flood fight. Federal troops and equipment were immediately dispatched to the area to assist in patrolling and maintaining levees in the town of Bonners Ferry and agricultural levees downstream to the international boundary. The success of the flood fight as directed by the district engineer is evident by the fact that, although the crest stage at Bonners Ferry exceeded the 1948 stage (maximum of record) by 0.2 foot,

only 7,260 acres of land in the Kootenai Valley was flooded as a result of dike failures as compared to about 40,000 acres flooded in 1948. The total flood damages from the 1954 flood in Kootenai Flats is estimated at \$2,400,000.

Floods of June 1954 in Iowa. Heavy rains occurred during the period 17-21 June 1954, averaging 5 to 8 inches over the upper reaches of the Cedar, Iowa, and Des Moines River Basins in northern Iowa. Major flooding occurred along the overflow plains of these rivers and their tributaries. The peak stage at Des Moines, Iowa, on the Des Moines River, was nearly 3 feet above the previous maximum of record which occurred in May 1903, and 3.7 feet above the disastrous 1947 flood. Damage to crops was heavy, especially in the flat land that comprises the headwaters of the Iowa, Cedar, and Des Moines River Basins. Total damage was estimated at \$14,800,000. Following the request of the Governor of the State for assistance, the district engineer at Rock Island, Ill., set up headquarters in Des Moines to assist city forces of Des Moines in the supervision of flood-fighting operations. Emergency crews with boats, from the Missouri River Division, reported to Des Moines to assist in the flood fight. The levees at Des Moines were raised nearly 4 feet to protect against the crest. As the flood progressed downstream from Des Moines, Corps of Engineers personnel and equipment were shifted to danger points to render assistance as was necessary.

Flood of June 1954, Rio Grande basin. Heavy rains of 25-27 June 1954 in the Rio Grande basin caused record-breaking flows on that river and its tributaries. Because these streams are characterized by their extremely rapid rise and almost as rapid recession, there was little opportunity for effecting flood-control measures while the flood was in progress. However, at the first indication that floods were occurring, immediate steps were taken to dispatch Corps of Engineers personnel to the flood area to collect engineering data, inspect damages, and to assist in rehabilitation activities. Assistance furnished under the provisions and procedures of the Disaster Act of 1950 included the removal of silt, debris and dead animals, and restoration of highways to use by traffic.

Vicksburg tornado. The tornado of 5 December 1953 developed on the Louisiana-Mississippi border just south of Vicksburg, Miss. It cut a path about a block wide across seven blocks of the main business district of Vicksburg where it lifted, only to descend again in a residential district. Destruction included 275 homes, 17 industrial plants, and 75 business buildings; 300 homes, 12 plants and 200 business buildings were damaged. It was

described by the press as the "worst disaster the city has suffered since the Civil War." A total of 38 persons lost their lives and 270 others were injured. Property damage was estimated at \$25 million. Coordinating with the commanding general, Third Army, the Corps of Engineers directed the restoration of vehicular access to stricken areas, search of collapsed buildings for the injured, and the elimination of immediate hazards to rescue workers and inhabitants. The division engineer, Lower Mississippi Valley Division, used all available personnel and facilities under his command.

Wreck removal. The removal of wrecks in navigable waters of the United States is governed by sections 19 and 20 of the River and Harbor Act approved 3 March 1899, and is predicated entirely upon their being obstructions to navigation. During the fiscal year, 63 wrecks were removed by the Corps of Engineers as obstructions to navigation.

2. ADMINISTRATION OF LAWS FOR PROTECTION OF NAVIGABLE WATERS

In administering during the year the Federal laws enacted for the protection and preservation of the navigable waters of the United States, 5,779 permits for structures or operations in navigable waters were issued and plans for 179 bridges, dams, dikes or causeways were approved. In addition, 38 extensions of time for commencement or completion of construction of bridges were granted. Action was continued on nine obstructive bridge cases in various stages of development. Sixty-seven sets of regulations for the use, administration, and navigation of navigable waters were established, including drawbridge regulations, establishment of anchorage grounds, special anchorage areas, danger zones, dumping grounds, restricted areas, fishing areas, and harbor lines.

The Corps of Engineers engaged in the following additional activities relative to the administration of the laws for protection of navigable waters: Investigations of the discharge or deposit of refuse matter of any kind in navigable waters; prevention of pollution of coastal navigable waters by oil; administrative determination of the heads of navigation and the extent to which the laws shall apply to specific streams; supervision of the harbor of New York to prevent obstructive or injurious deposits in the tidal waters thereof, including the waters of Long Island Sound; establishment of reasonable rates of toll for transit across bridges over navigable waters; granting of permits for the occupation

and use of Federal works under control of the Corps of Engineers; reports of international boards on operations affecting international boundary waters; and legislation in connection with the foregoing.

There is a continuing program to prevent deposits or to obtain the removal of any deposits in channels which obstruct navigation or increase Federal maintenance costs. In 9 areas of the country, 24 industries and 5 municipalities are removing, have been requested to remove, or are participating in the removal of shoals for which they are responsible. Negotiations are under way on 7 waterways with 16 companies for remedial action in connection with waste deposits causing shoaling and negotiations are planned with 3 additional companies.

During the year complaints were received that the toll charges of the Delaware River Port Authority bridge between Philadelphia, Pa., and Camden, N. J., were not reasonable and just and action was taken under the Administrative Procedure Act to review the complaints. Hearings were presided over by an examiner obtained on loan from the Interstate Commerce Commission. The Secretary of the Army found that the rates of tolls were not unreasonable within the intent of the Bridge Act of 1946.

Near the close of the fiscal year, the Task Force on Water Resources and Power, Commission on Organization of the Executive Branch of the Government, forwarded statements of State Highway Departments dealing with clearances and operation of bridges across navigable waters. In connection with its continuing studies of this subject, the Corps of Engineers is making a thorough review of its policy on bridge clearances with a view to resolving the problems involved in meeting the requirements of both the water and land transportation interests.

3. REGULATION OF HYDRAULIC MINING, CALIFORNIA

The California Debris Commission, created by act of Congress, regulates hydraulic mining in the drainage area of the Sacramento and San Joaquin Rivers to prevent the resulting debris from being carried into navigable waters. The Commission has licensed 22 mining operators, of which 6 utilize storage behind the Federal debris dams.

During the year the Harry L. Engelbright Dam and the North Fork Dam, together with their appurtenant service facilities, were operated and maintained for the storage of hydraulic mining debris. On the Yuba River, repair of the Daguerre Point Dam, a debris barrier, and clearing, snagging, and bank-protection

work was accomplished. The cost of this activity is paid in part from funds provided from receipts of contributed funds.

4. UNITED STATES LAKE SURVEY

Under the authorized project, the United States Lake Survey prosecuted its continuing program of preparation and revision of charts for navigation of the Great Lakes, the New York State canal system, Lake Champlain and the Minnesota-Ontario border lakes. Work progressed during the fiscal year 1954 on the basis of a 15-year program, insofar as practicable, comprising, in addition to chart preparation and sale, hydrographic surveys, engineering studies and flow measurements, and the Great Lakes Pilot publication.

Emergency sweeping operations were conducted for determining the extent of shoaling where groundings had been reported at the southern end of Lake Huron and in the vicinity of lower Whitefish Bay in Lake Superior. A complete hydrographic survey was made of a portion of the west end of Lake Erie between Toledo and the mouth of the Detroit River, and also of selected portions of the St. Clair River. Revisory surveys were made for revision of navigation charts for positions of prominent landmarks, addition of new features, and for United States harbors on Lake Michigan, selected harbors on Lake Huron, and the St. Marys River. Offshore hydrography was completed in Green Bay, Mich., covering approximately 1,600 miles of sounding. Forty-six gaging sites were maintained for recording and predicting the levels of the Great Lakes and the connecting rivers.

5. WASHINGTON, D. C., WATER SUPPLY

With funds appropriated for the District of Columbia, the Corps of Engineers continued the operation, maintenance, repair, and protection of the water-supply facilities, known as the Washington Aqueduct, to provide an uninterrupted and adequate supply of purified water to the distribution systems of the District of Columbia and adjacent Maryland and Virginia areas as authorized by law. The maximum daily consumption provided by the existing facilities was about 263 million gallons, and the average daily consumption was about 166 million gallons.

In order to meet the increasing demand for water, construction work continued on the long-range expansion program. Construction work on major improvement items consisted of completion of a new 30-million-gallon clear-water basin at Dalecarlia and initiation of construction of the third high-transmission main.

Preparation of plans and specifications continued for constructing a new pumping station at Dalecarlia; Little Falls pumping station, dam and tunnel; and a new filtered-water reservoir.

6. ST. LAWRENCE RIVER JOINT BOARD OF ENGINEERS

This board, having a United States and Canadian section, was created pursuant to the Order of Approval issued by the International Joint Commission on 29 October 1952. The United States section was established by Executive Order issued 4 November 1953. Members of the United States section are the Secretary of the Army and the Chairman of the Federal Power Commission, with the Deputy Chief of Engineers for Construction and the Chief of the Commission's Bureau of Power as alternates.

The duties of the board are to review and approve the plans, specifications, and work schedules for the \$600 million power development in the International Rapids section, St. Lawrence River, of the Power Authority of the State of New York and the Hydroelectric Power Commission of Ontario, the joint builders, filed for clearance in behalf of both Federal Governments, and to inspect construction operations to insure conformance of board approvals. Funds in the amount of \$245,000 were appropriated to finance the activities of the United States section during the fiscal years 1954 and 1955. A small engineering staff to support the United States group has been established at the job site (Massena, N. Y.), with Washington liaison. Supervision of construction pursuant to the Federal Power Commission license issued 15 July 1953 to the power authority has also been assigned to the United States section, thus integrating these two Federal supervisory activities. Costs of the United States section are, under a provision in the Appropriation Act, to be reimbursed by the Power Authority.

7. FOREIGN TECHNICAL ASSISTANCE

During the fiscal year the Corps of Engineers continued to render technical assistance on projects in foreign-aid programs upon request of the Foreign Operations Administration and the Department of State. Work was continued on the preparation of a comprehensive engineering report for use by the Paraguayan Government in connection with development of the Paraguay River for navigation. Technical assistance through review of plans and reports and laboratory analyses of foundation materials was rendered the French Government in connection with the proposed construction of a large earth-fill dam near Gap, France.

The procurement of one 16-inch pipeline dredge for the Government of the Philippines and three 12-inch and four 8-inch pipeline dredges with attendant plant, such as tugs and fuel barges, for Indochina, were initiated during the year; and qualified engineering specialists were detailed to Pakistan to study and make recommendations for harbor development and flood control. The Corps of Engineers received foreign government representatives and engineers from 20 friendly nations, and afforded them the opportunity to visit laboratories and construction projects to study construction methods, use of modern heavy equipment, and contractors' organizations. In addition, the Corps upon request made available engineering information to foreign engineers and Government representatives on a diversity of subjects in the field of flood control, harbor and power engineering.

8. WORK FOR OTHER AGENCIES

Major dredging operations were carried out during the year for the United States Maritime Administration, with funds transferred from that agency, at the reserve fleet site at Astoria, Oreg. Construction of cathodic protection systems for vessels was performed at the United States Maritime Administration reserve fleet sites at Wilmington, N. C.; Suisun Bay, Calif.; Astoria, Oreg.; Olympia, Wash. There were also constructed for that agency facilities for furnishing commercial power to ships at the Hudson River reserve fleet site and a bulkhead at the reserve fleet site at Beaumont, Tex., as well as undertaking surveys and preparation of plans and specifications for rehabilitation of Maritime North Carolina Shipyard.

Major dredging operations were carried out for the Department of the Navy, with funds transferred from that agency, in Ribault Bay, Fla.; in St. Johns River, Fla.; at approach channel and turning basin at Naval Air Station, Alameda, Calif.; at Pearl Harbor, T. H.; in turning basin and slips at Norfolk naval shipyard, Portsmouth, Va.; and for shore protection at United States Naval Air Missile Test Center, Point Mugu, Port Hueneme, Calif.

Dredging was performed for the Civil Aeronautics Authority at Four-Mile Run, Va., with funds transferred from that agency. Planning was continued on the DeLuz Dam project, Santa Margarita River, Calif., with funds provided by the Department of the Navy. This project has been transferred to the Bureau of Reclamation in accordance with Public Law 547, 83d Congress 2d Session, approved 28 July 1954.

CHAPTER VII

ECONOMY MEASURES

1. OVERHEAD, FIELD OFFICES AND PERSONNEL

Overhead costs. During the year, continuing efforts were exerted to decrease the percentage of overhead costs. The success of these efforts during the past 5 years and a picture showing the share of the construction dollar on river and harbor and flood-control work which has gone to the construction industry is indicated on the following chart.

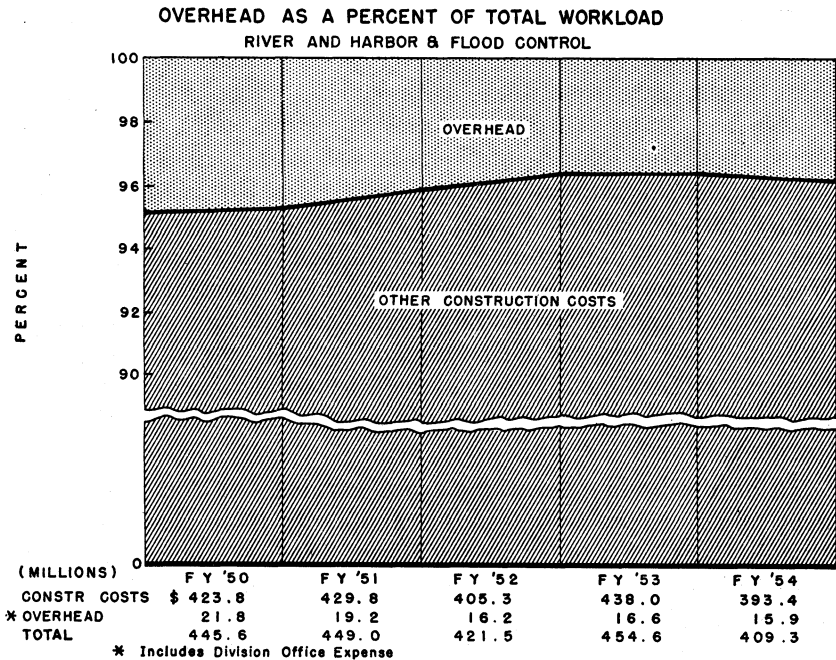


CHART VII.

Consolidation of field offices. It is the established policy of the Corps of Engineers to modify the structure of its field organization as necessary to compensate for changes in workload. Pursuant to this policy, decision was made during the year to abolish the Upper Mississippi Valley Division office, merging its functions with those of the Great Lakes Division and Lower Mississippi Valley Division. It is estimated that this move will result in annual savings of not less than \$100,000. The Duluth and Fort Peck Districts, already attached to the Milwaukee and Garrison Districts, respectively, have been reduced still further to the status of operating districts as the result of declining workloads in those districts. The above realignment in field organization will effect important economies in personnel and office costs without impairing service to the public in carrying out the authorized program of the Corps.

Reduction in personnel. Continued successful efforts were made to eliminate unnecessary positions and to accomplish the greatest amount of work with the least number of employees consistent with good business practice and proper employee relationships. Chart VIII shows the declining number of civilians employed on civil functions since 1949.

Other economy efforts. In view of the tremendous expense of clearing the pool areas of multiple-purpose projects, a committee was set up to study the economies of various practices in partial clearing. As a result, modifications were made in the previous policy of 100 percent clearing of pool areas and a decided reduction was achieved in the amount of clearing to be done. On projects underway 2 years ago, this change in policy has resulted in savings of approximately \$40 million without an appreciable increase in operational costs or hazards.

2. CIVIL WORKS INVESTIGATIONS PROGRAM

During the last 7 years the Corps of Engineers has conducted a program of investigations aimed at improving design and construction procedures for and decreasing the costs of civil-works projects. A large portion of this program has been administered and accomplished by the Waterways Experiment Station, the Corps' principal laboratory for the conduct of technical investigations, model testing, and development work in such fields as hydraulics, soil mechanics, and concrete. It is estimated that direct savings in construction costs which have resulted from the Civil Works Investigations Program amount to several million dollars annually. The most outstanding are described in the paragraphs which follow.

PERSONNEL ON CIVIL FUNCTIONS

THOUSAND PERSONS



CHART VIII.

Paints and protective coatings. Investigation of commercially available paints and protective coatings suitable for application to hydraulic structures, and of improved techniques for preparation of surfaces and application has increased the useful service life of coatings from about 2 years to as much as 8 years. Resulting savings are estimated to be \$500,000 annually.

Spillway design investigations. Investigation by means of models of the proper shapes for spillway crests and piers has resulted in adoption of improved designs with increased discharge capacities. Smaller and fewer crest gates and shorter spillways can thus be utilized without sacrifice of discharge capacity, with consequent savings in cost of structures. At Garrison Dam the number of crest gates was reduced from 30 to 28 and the spillway shortened 100 feet as a result of the improvements in design. The resulting saving in cost of construction at this project alone is estimated at \$1 million.

Slide gates for regulating discharge through conduits at high heads. Model and prototype investigations were conducted for the purpose of improving the design of slide gates to make them usable for regulating discharge under operating heads up to 200 feet. Prior to completion of these investigations for such regulating, it has been necessary to use more costly regulating devices such as needle and Howell-Bunger valves. As a result of these investigations, it was possible to reduce the number of outlet conduits at Pine Flat Dam from the 15 originally considered to 10, with a saving of \$500,000 in construction cost. Comparable savings will be made on other high-head dams built in the future.

Slope protection for earth dams. In 1946 a comparative survey of 100 selected earth dams was started to obtain data on the performance of various types of slope protection. A report of this survey was published in 1949 in bulletin form. As a result of the survey, improved criteria for selecting riprap on the basis of wind velocity, duration, and fetch were adopted. Savings in the construction cost of slope protection since then is estimated at more than \$2 million.

Bore hole camera. A unique device for photographing the surface of small diameter bore holes drilled for the purpose of investigating subsurface conditions at dam sites has been developed. Work was started in 1944, and the first camera was completed and tested in 1950. An ingenious optical system involving a conical mirror for the camera eye produces the required 360° image of the bore-hole surface, which is photographed on 16-mm. moving-picture film. The flat image picture is projected by reverse optics on a cylindrical screen, and the observer is thus

able to view by small segments the full-scale reproduction of the entire surface of a bore hole from top to bottom.

Entrained air and improved fine aggregate grading control for concrete. Investigations have shown that use of a small controlled quantity of entrained air in concrete improves workability, reduces the required amount of mixing water, and improves the resistance of the hardened concrete to attack by weathering agencies. The improvement in workability and reduction in required amount of mixing water has made it possible to appreciably reduce the amount of cement necessary for strength and placeability in mass concrete for gravity-type dams and for concrete for other hydraulic structures. In order to obtain maximum benefits from use of entrained air in concrete, the aggregates used, particularly the fine aggregate, must be properly graded and the grading closely controlled. Investigations have also been made as a basis for determining desirable gradings for fine aggregate, and specifications have been written to insure proper control of grading. Due to the use of entrained air in concrete with properly graded and controlled aggregates, it has been possible to effect a reduction in cement of between one-fourth bag and one-half bag per yard of concrete. Approximately 25 million cubic yards of concrete have been placed in this manner, with a saving of over \$5 million. Reduced cost due to longer life and lower maintenance cost on structures built using entrained air concrete also are difficult to evaluate, but may easily equal the saving in construction cost due to the reduction in quantity of cement used.

Absorptive form lining. Prior to the beginning of general use of entrained air in concrete, attempts were made to improve surface quality by utilizing absorptive material as a form lining to impart a dense "casehardened" effect to the surface. Investigations into the value of absorptive form lining with entrained air concrete were conducted and as a result, the use of absorptive form lining was discontinued on four projects then under construction with a saving of about \$400,000.

CHAPTER VIII

FISCAL TABLES

The funds with which the works for the maintenance and improvement of rivers and harbors and flood control were prosecuted during the fiscal year were derived from unexpended balances of prior appropriations and from the following appropriation acts, and by transfer from other departments:

Table 18. Appropriations

Appropriation title	Date of act	Amount
CIVIL FUNCTIONS APPROPRIATION ACT, 1954.	27 July 1953.....	-----
General Investigation, Corps of Engineers, Civil.	-----	\$2,867,500.00
Construction, General, Corps of Engineers, Civil.	-----	278,670,000.00
Operation and Maintenance, General, Corps of Engineers, Civil.	-----	79,000,000.00
General Expenses, Corps of Engineers, Civil, 1944-54.	-----	9,716,000.00
Flood Control, Mississippi River and Tributaries.	-----	51,433,000.00
Revolving Fund, Corps of Engineers.....	-----	100.00
		421,686,600.00
SUPPLEMENTAL APPROPRIATION ACT, 1954.	7 Aug. 1953.....	-----
Niagara Remedial Works, Corps of Engineers, Civil.	-----	1,500,000.00
Special Fund (Credits to Accounts From Licenses Under Federal Water Power Act, 26 Aug. 1935): Maintenance and Operation of Dams and Other Improvements to Navigable Waters.	26 Aug. 1935....	152,453.14
Payments to States, Flood Control Act, 28 June 1938, as amended.	28 June 1938....	988,884.52
THIRD SUPPLEMENTAL APPROPRIATION ACT, 1954.	11 May 1954.....	-----
Construction, General, Corps of Engineers, Civil.	-----	800,000.00
United States Section, St. Lawrence River Joint Board of Engineers, Corps of Engineers, Civil, 1954-55.	-----	245,000.00
		1,045,000.00

The total actually expended under the direction of the Chief of Engineers in connection with the maintenance and improvement of rivers and harbors, flood control, and other miscellaneous works during the fiscal year ended 30 June 1954, follows:

Table 19. *Accrued Expenditures (costs)*

Appropriation title	Appropriation act	Total
RIVERS AND HARBORS AND FLOOD CONTROL:		
Flood Control Mississippi River and Tributaries.	(1)	\$52,029,976.32
General Investigations, Corps of Engineers, Civil.	(1)	3,293,248.71
Construction, General, Corps of Engineers, Civil.	(1)	382,364,335.43
Operation and Maintenance, General, Corps of Engineers, Civil.	(1)	79,810,517.43
General Expenses, Corps of Engineers, Civil, 1944-54.	(1)	9,797,777.49
Maintenance and Operation of Dams and Other Improvements to Navigable Waters.	26 Aug. 1935----	152,453.14
Total rivers and harbors and flood control.	-----	<u>527,448,308.52</u>
MISCELLANEOUS APPROPRIATIONS:		
Hospital and Domiciliary Facilities, Veterans Administration (Transfer to Army).	4 Mar. 1931----	6,201,839.18
Niagara Remedial Works, Corps of Engineers, Civil.	7 Aug. 1953-----	913,799.83
U. S. Section, St. Lawrence River Joint Board of Engineers, Corps of Engineers, Civil, 1954-55.	11 May 1954----	254.02
Payments to States, Flood Control Act, 28 June 1938, as amended.	28 June 1938----	988,884.52
Hydraulic Mining in California, Debris Control.	19 June 1934----	29,392.31
Total miscellaneous appropriations.	-----	<u>8,134,169.86</u>
CONTRIBUTED AND ADVANCED FUNDS:		
River and Harbor, Contributed Fund-----	(2)	5,511,211.66
River and Harbor, Advanced Fund-----	(2)	169,659.08
Total contributed and advanced funds.	-----	<u>5,680,870.74</u>
Total Engineer Department and Contributed funds.	-----	<u>541,263,349.12</u>

Table 19. *Accrued Expenditures (costs)*—Con.

Appropriation title	Appropriation act	Total
WORKING FUNDS (transfers from other departments):		
Working Fund, Army Engineers, Civil, No Year (Various Projects).	-----	\$2,546,524.21
Working Fund, Army Engineers, Civil, 1948-52.	-----	121,500.00
Working Fund, Army Engineers, Civil, 1953.	-----	192,306.57
Working Fund, Army Engineers, Civil (Special Fund), 1953-54.	-----	39,675.54
Working Fund, Army Engineers, Civil, 1954.	-----	1,081,157.81
Working Fund, Army Miscellaneous, Civil, 1950-53.	-----	12,370.98
Working Fund, Army Engineers, Civil (Trust Fund).	-----	4,832.21
Military Assistance Near East and Africa, Executive (Allocated Working Fund Corps of Engineers, Civil), 1950-54.	-----	473,087.03
Soldiers Home ¹ Permanent Fund (Allocated Fund to Corps of Engineers, Civil).	-----	2,029,476.30
Maintenance and Operation, U. S. Soldiers Home ¹ (Allocated Working Fund to Corps of Engineers), Civil, 1952.	-----	300,000.00
Capital Outlay, U. S. Soldiers Home ¹ (Allocated Working Fund to Corps of Engineers, Civil).	-----	329,482.35
Total working funds-----	-----	7,130,413.00
Grand total—accrued expenditures----	-----	548,393,762.12

¹ Annual or supplemental.² Trust funds.

The funds transferred from other departments as working funds are summarized in the following table.

Table 20. Funds Transferred From Other Departments

Appropriation title	Act	Amount
Working Fund, Army Engineers, Civil-----	Various-----	\$999,710.40
Working Fund, Army Engineers, Civil, 1952-----	Various-----	-9,107.00
Working Fund, Army Engineers, Civil, 1953-----	Various-----	-122,739.08
Working Fund, Army Engineers, Civil, 1954-----	Various-----	1,339,851.75
Military Assistance, Near East and Africa, Executive (Allocated Working Fund, Corps of Engineers, Civil), 1950-54.	Various-----	973,497.89
Consolidated Working Fund, Army Engineers, Civil, (Trust Fund).	Various-----	6,284.19
Soliders Home Permanent Fund (Allocated Fund to Corps of Engineers, Civil).	Various-----	-360.00
Maintenance and Operation, U. S. Soldiers Home (Allocated Working Fund to Corps of Engineers, Civil, 1953).	Various-----	-69,610.00
Capital Outlay, U. S. Soldiers Home (Allocated Working Fund to Corps of Engineers, Civil.)	Various-----	810,500.00
Working Fund, Army Engineers, Civil (Special Fund), 1953-54.	Various-----	41,600.00
Total working funds-----	-----	3,969,628.15

Trust funds (contribution and advances) under various acts are summarized below:

Rivers and harbors, contributed fund-----	\$6,723,405.27
Rivers and harbors, advanced fund-----	1,357,500.00
	8,080,905.27

The following amounts have been advanced by local interests for river and harbor improvements under the provisions of section 11, River and Harbor Act, 3 March 1925, and for flood-control works under the provisions of the act of 15 October 1940, and are returnable to the same interests when necessary Government funds are available.

Table 21. Funds Advanced By Local Interests

	District	Balance from United States 30 June 1953	Amount received during fiscal year	Amount returned during fiscal year	Balance due from United States 30 June 1954
Sacramento River, Calif-----	Sacramento, Calif....	\$200,000	-----	-----	\$200,000
Jones Beach Inlet, N. Y-----	-----	-----	\$1,357,500	-----	1,357,500
Gulf Intracoastal Waterway, Franklin Canal, St. Marys Parish, La-----	New Orleans, La....	44,000	-----	-----	44,000
Total, rivers and harbors-----	-----	244,000	1,357,500	-----	1,601,500
Buffalo Bayou, Tex-----	Fort Worth, Tex....	2,900,000	-----	-----	2,900,000
Grand total-----	-----	3,144,000	1,357,500	-----	4,501,500

CHAPTER IX

WATERBORNE COMMERCE OF UNITED STATES

Waterborne commerce of the United States during the calendar year 1953 was nearly 36 million tons greater than in 1952 and almost equaled the 1951 all-time high. The 1953 total was 923,547,693 tons, compared with 887,721,984 tons in 1952 and 924,128,411 tons in 1951. A significant feature of the 1953 traffic was the increase in waterborne freight carried on the inland waterways. This freight rose to a record total of 202 billion ton-miles, compared with 168 billion ton-miles in 1952 and the previous all time high of 182 billion ton-miles in 1951.

Principal increases in the inland waterways freight occurred on the Great Lakes and Mississippi River systems, on which 127 billion and 42 billion ton-miles, respectively, were carried in 1953. Leading individual coastal ports by geographical regions included: Boston, 18,100,000 tons; New York, 139,400,000; Philadelphia, 37,300,000; Baltimore, 41,800,000; Norfolk, 24,100,000; New Orleans, 39,700,000; Houston, 44,300,000; Los Angeles, 19,700,000; Portland, Oregon, 11,700,000; Seattle, 11,800,000. The coastal roads having a concentration of harbors include the following, the tonnages shown being gross totals: Delaware River from Trenton, N. J., to the sea, 83,400,000 tons; Hampton Roads, Va., 36,300,000; San Francisco Bay area, Calif., 44,900,000; Columbia and Lower Willamette Rivers, Oreg. and Wash., 17,400,000. Among the leading individual Great Lakes ports in the several States bordering the lakes were: Duluth-Superior, 77,200,000 tons; Two Harbors (Agate Bay) (Minn.), 23,600,000; Milwaukee, 8,200,000; Chicago, 38,300,000; Indiana Harbor, 20,000,000; Detroit, 25,500,000; Toledo, 31,600,000; Erie, 7,300,000; Buffalo, 22,000,000.

The generally upward trend in the total tonnage of waterborne commerce during the past 10 calendar years is indicated on chart IX.

There are presented in the following tabulations the national summaries of the waterborne commerce of the United States and the Territories and possessions during the calendar year 1953, including the tonnages handled at ports and harbors and moved on the waterways and canals improved by the Corps of Engineers

as authorized by Congress. Detailed data on the commodities handled and the vessel trips at the ports and on the individual waterways are contained in the following four separate publications which may be purchased from the sales agent of the Superintendent of Documents, U. S. Lake Survey, Corps of Engineers, U. S. Army, 630 Federal Building, Detroit 26, Mich.:

Waterborne Commerce of the United States, Calendar Year 1953:

Part 1—Atlantic Coast.

Part 2—Gulf Coast, Mississippi River System, and Antilles.

Part 3—Great Lakes.

Part 4—Pacific Coast, Alaska, and Pacific Islands.

The terms applied to the kinds of traffic are explained in each of these regional publications.

Authorization for the collection of these data is contained in various river and harbor acts enacted by the Congress through the years, the principal authorization being section 11 of the River and Harbor Act of 22 September 1922. While the information as now collected and compiled is designed to meet the administrative requirements of the Corps of Engineers in connection with the prosecution of the navigation program, it also provides necessary and vital data for other governmental departments, commercial and shipping concerns, and others interested in transportation.

NET TOTAL WATER-BORNE COMMERCE OF THE UNITED STATES
(in tons of 2,000 pounds)

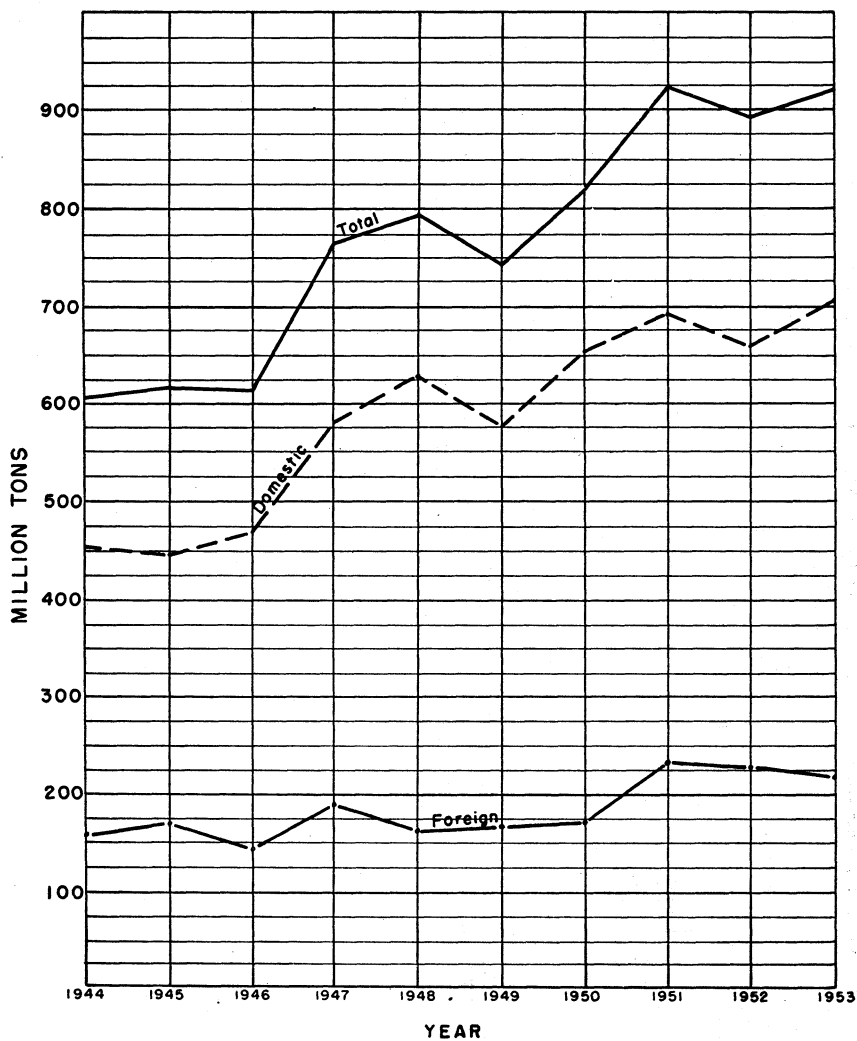


CHART IX.

Table 22. Net Total Water-Borne Commerce of the United States, Calendar Years 1947-53

[In tons of 2,000 pounds]

Year	Net total	Foreign								Domestic						
		Imports				Exports				Total	Coast-wise	Lakewise	Internal	Intra-port	Local	Intra-territory
		Total	Coastal ports	Great Lakes from Canada	Great Lakes from overseas	Total	Coastal ports	Great Lakes to Canada	Great Lakes to overseas							
1947....	766,816,730	62,162,169	57,365,892	4,773,223	23,054	126,093,946	101,995,508	24,054,718	43,720	578,560,615	153,098,204	163,180,337	149,614,401	57,410,575	55,257,098	(1)
1948....	793,200,465	72,297,097	68,077,704	4,172,628	46,765	90,674,494	65,403,800	25,227,288	43,406	630,228,874	174,080,850	172,490,721	169,697,866	58,944,696	55,014,741	(1)
1949....	740,720,971	81,992,016	77,153,266	4,774,784	63,966	83,366,265	65,739,775	17,552,872	73,618	575,362,690	161,430,662	145,591,636	165,702,829	48,323,356	54,314,207	(1)
1950....	820,583,571	101,981,918	96,299,288	5,555,427	127,203	² 67,242,777	43,640,100	23,498,355	84,874	651,358,876	182,543,761	169,880,810	190,788,910	51,703,560	55,202,362	1,239,473
1951....	924,128,411	108,747,297	101,812,769	6,827,294	107,234	² 123,308,535	97,602,937	25,573,518	103,667	692,072,579	186,759,124	178,463,212	213,404,964	50,952,725	61,075,892	1,416,662
1952....	887,721,984	115,961,025	108,674,301	7,152,087	134,637	² 111,365,252	85,072,313	26,129,081	114,679	660,395,707	184,207,006	154,112,031	216,644,384	49,182,353	54,790,101	1,459,832
1953....	923,547,693	127,981,407	120,594,892	7,056,629	329,886	² 89,415,082	63,780,288	25,415,354	160,663	706,151,204	188,757,641	188,621,385	224,957,448	47,902,038	54,659,693	1,252,999

¹ Included in other types of domestic traffic.² Includes 19,448 tons in 1950, 28,413 tons in 1951, 49,179 tons in 1952, and 58,777 tons in

1953 of Department of Defense controlled cargo and Special Category commodities shipped from Great Lakes ports; breakdown by Canadian and overseas not available.

Table 23. Summary of Foreign and Domestic Waterborne Commerce, by Type of Traffic and Commodity, Calendar Year 1953

[Net traffic in tons of 2,000 pounds]

Commodity	Total	Foreign		Domestic						
		Imports	Exports	Total	Coast-wise	Lake-wise	Internal	Intra-port	Local	Intra-territory
Total, all commodities.....	923,547,693	127,981,407	89,415,082	706,151,204	188,757,641	188,621,385	224,957,448	47,902,038	54,659,693	1,252,999
ANIMALS AND ANIMAL PRODUCTS, EDIBLE										
005 Animals, edible.....	48,351	3,825	1,065	43,461	501	1,449	105	-----	28,968	12,438
010 Meat and meat products, fresh, chilled or frozen....	92,779	4,706	13,694	74,379	30,364	43,569	75	17	260	94
013 Meat and meat products, canned.....	21,913	-----	18,305	3,608	1,340	459	1,584	155	61	9
017 Meat and meat products, otherwise prepared or preserved.....	117,281	-----	83,064	34,217	33,019	895	46	210	-----	47
018 Meat and meat products, otherwise prepared or preserved, including canned meat products.....	141,740	141,740	-----	-----	-----	-----	-----	-----	-----	-----
020 Animal oils and fats, edible.....	318,977	510	219,835	98,632	20,424	2,199	6,838	67,077	2,016	78
033 Condensed and evaporated milk.....	130,644	8,674	95,190	26,780	20,326	-----	2,965	864	1,631	994
035 Dried milk and solids.....	109,762	3,972	88,657	17,133	13,211	-----	2,481	-----	1,434	7
037 Cheese.....	92,710	33,268	4,067	55,375	2,771	52,182	-----	78	341	3
039 Dairy products, n. e. c.....	152,935	1,386	17,629	133,920	17,825	115,780	-----	263	46	6
040 Fish and fish products, fresh or frozen, except shellfish.....	1,106,824	112,799	1 2,497	991,528	42,920	3,541	98,129	182	846,716	40
043 Fish and fish products, canned, except shellfish.....	171,460	-----	35,382	136,078	87,692	1,808	45,306	-----	4	1,268
045 Fish and fish products, otherwise prepared or preserved, except shellfish.....	33,973	-----	5,889	28,084	25,811	-----	1	1,268	561	443
047 Fish and fish products, otherwise prepared or preserved, except shellfish, including canned fish and fish products.....	136,629	136,629	-----	-----	-----	-----	-----	-----	-----	-----
049 Shellfish and products.....	949,769	43,190	7,512	899,067	17,666	-----	434,033	1,120	446,245	3
050 Eggs and egg products.....	26,764	558	18,854	7,352	4,380	-----	2,950	1	21	-----
055 Edible animal products, n. e. c.....	9,418	2,678	1,529	5,211	502	1,543	3,165	-----	-----	1

Footnotes at end of table.

Table 23. Summary of Foreign and Domestic Waterborne Commerce, by Type of Traffic and Commodity, Calendar Year 1953—Continued

[Net traffic in tons of 2,000 pounds]

Commodity	Total	Foreign		Domestic						
		Imports	Exports	Total	Coast-wise	Lake-wise	Internal	Intra-port	Local	Intra-territory
ANIMALS AND ANIMAL PRODUCTS, INEDIBLE										
060 Hides and skins, raw, except furs.....	196,964	80,072	86,066	30,826	15,339	15,090	29	310	-----	58
065 Leather and leather manufactures.....	59,387	9,863	12,081	37,443	31,855	5,587	-----	-----	-----	1
075 Furs and manufactures.....	13,504	11,217	1,943	344	47	-----	-----	297	-----	-----
090 Animals, inedible.....	2,739	564	2,112	63	57	2	1	-----	-----	3
094 Sea shells, unmanufactured.....	17,455,898	5,476	¹ 5,163	17,445,259	36,167	-----	9,277,191	435,352	7,696,549	-----
095 Animal products, inedible, n. e. c.	1,727,635	274,020	683,635	769,980	52,034	2,411	93,835	85,388	536,312	-----
VEGETABLE FOOD PRODUCTS AND BEVERAGES										
100 Corn.....	6,327,078	25,122	3,355,068	2,946,888	8,705	522,726	2,244,274	149,458	21,633	92
101 Rice.....	1,004,928	12,499	628,818	363,611	245,920	-----	116,365	155	212	959
102 Barley and rye.....	1,677,730	1,191,220	278,941	207,569	35	178,660	27,518	830	526	-----
103 Wheat.....	10,317,206	252,818	6,972,059	3,092,329	19,933	1,958,184	1,094,714	11,000	8,495	3
104 Oats.....	1,282,498	969,464	¹ 18,853	294,181	5,186	34,642	247,988	6,031	328	6
107 Wheat flour.....	1,141,743	654	953,907	187,182	78,765	99,024	7,023	1	2,155	214
108 Other grains.....	585,458	7	216,820	368,631	38,468	84,844	40,329	130,220	74,770	-----
109 Other flour and flour and grain preparations, n. e. c.	422,926	12,563	184,297	226,066	41,275	179,871	4,449	254	50	167
110 Animal feeds (fodders and feeds), n. e. c.	1,136,721	276,378	237,871	622,472	157,479	63,933	33,508	50,568	311,826	5,158
120 Vegetables and preparations, fresh or frozen.....	506,018	111,750	116,039	278,229	86,785	25,568	137,942	3,150	9,710	15,074
123 Vegetables and preparations, canned.....	572,133	-----	63,454	508,679	361,669	60,497	68,035	541	17,478	459
125 Vegetables and preparations, n. e. c., including canned vegetables and preparations and soybean flour.....	133,083	133,083	-----	-----	-----	-----	-----	-----	-----	-----
127 Vegetables and preparations, n. e. c.	244,688	-----	179,580	65,108	60,052	-----	2,361	2,361	172	162
130 Fruits and preparations, fresh or frozen, except bananas.....	730,046	72,869	270,664	386,513	81,350	7,218	877	13,524	7,089	276,455
132 Bananas, fresh.....	1,902,822	1,900,334	¹ 2,162	326	308	18	-----	-----	-----	-----
133 Fruits and preparations, dried or evaporated.....	177,955	-----	113,152	64,803	63,338	-----	600	865	-----	-----

135	Fruits and preparations, canned.....	898,013		69,703	828,310	806,087	6,003	11,429	124		4,667
136	Fruit juices, canned or frozen.....	213,361	51,018	74,292	88,051	85,350		497	50		2,154
137	Fruits and preparations except fruit juices, otherwise prepared or preserved.....	25,529		10,242	15,287	15,284					3
138	Fruits and preparations otherwise prepared and preserved, including dried and evaporated and canned fruits and preparations.....	201,140	201,140								
140	Nuts and preparations.....	178,094	134,484	24,043	19,567	15,816		2,266	811	605	69
150	Vegetable oils and fats, edible.....	179,693	47,588	49,916	82,189	9,237		3,059	54,437	15,450	6
160	Coffee, raw or green.....	1,643,626	1,445,091	30,187	168,348	15,674		23,309	82,792	46,324	249
161	Cocoa beans and shells.....	339,143	294,481	16,023	28,639	2,855		191	24,258	1,335	
165	Tea, except impure tea, siftings, waste, etc.....	66,430	61,328	1,278	3,824	2,601		792		431	
167	Cocoa, chocolate, coffee preparations and table beverage materials, n. e. c.....	54,343	42,439	6,529	5,375	3,902		1,472			1
170	Spices.....	56,523	50,714	4,769	1,040	897		16	127		
180	Sugar.....	7,144,536	3,881,038	81,082	3,182,416	2,144,268	4,140	916,133	26,958	8,692	82,225
185	Molasses, edible, honey, sirup and other related sugar products.....	262,927	86,350	60,458	116,119	66,425		32,159	17,095	362	78
190	Distilled spirits, malt liquors, and wines.....	547,057	205,701	46,781	294,575	199,446	58,445	31,256	455	2,478	2,495
195	Beverages and sirups, n. e. c.....	154,808	1,785	11,665	141,358	8,627	109,022	23,289	9	92	319
199	Groceries and food, n. e. c.....	191,381	805,599	28,362	191,381	174,336		13,391	1,400	1,147	1,107
VEGETABLE PRODUCTS, INEDIBLE, EXCEPT FIBERS AND WOOD											
200	Rubber, crude, and allied gums.....	864,672	805,643	28,391	30,638	2,990		21,926	3,879	1,843	
201	Synthetic rubbers.....	75,303	6	34,822	40,475	40,409		66			
203	Rubber waste and scrap.....	22,011	9,724	12,240	47	28		19			
204	Rubber tires and inner tubes, except S. C. i.....	20,440		20,440							
205	Rubber tires and inner tubes.....	31,288	3,425		27,863	13,222	14,624	15			2
207	Rubber manufactures, n. e. c.....	62,596	5,665	28,624	28,307	11,444	11,115	5,748			
210	Naval stores, gums, and resins.....	268,691	66,373	176,873	25,445	23,452		1,170	489	333	1
220	Drugs, herbs, leaves, and roots, crude.....	38,038	32,179	2,662	3,197	3,183			1	13	
231	Soybeans.....	1,793,205	6	1,234,198	559,001	1,989	6,195	506,923	43,894		
232	Flaxseed.....	135,582	3	55	135,524		119,398	16,126			
233	Copra.....	330,777	323,341	51	7,385	206		2,608		4,571	
234	Castor beans.....	57,799	57,799								
235	Oilseeds, n. e. c.....	57,952		16,448	51,504	32		8,324	32,230	10,918	

Footnotes at end of table.

Table 23. Summary of Foreign and Domestic Waterborne Commerce, by Type of Traffic and Commodity, Calendar Year 1953—Continued

[Net traffic in tons of 2,000 pounds]

Commodity	Total	Foreign		Domestic						
		Imports	Exports	Total	Coast-wise	Lake-wise	Internal	Intra-port	Local	Intra-territory
236 Oilseeds, n. e. c., except castor beans.....	12,023	12,023	-----	-----	-----	-----	-----	-----	-----	-----
240 Vegetable oils, fats, and waxes, inedible and/or crude.....	414,198	213,236	93,040	107,922	15,373	-----	5,275	64,569	22,702	3
250 Vegetable dyeing and tanning materials.....	242,954	231,049	5,947	5,958	608	-----	4,974	220	156	-----
260 Seeds, except oilseeds.....	81,482	32,812	32,043	16,627	11,396	2,323	939	-----	1,969	-----
280 Tobacco, unmanufactured.....	388,736	68,978	307,157	12,601	9,896	-----	1,218	796	691	-----
285 Tobacco, manufactured.....	39,137	843	30,791	7,503	7,302	-----	-----	171	11	19
290 Molasses, inedible.....	3,528,931	2,335,572	154,909	1,038,450	485,169	5,334	404,290	24,226	103,241	16,190
297 Vegetable products, inedible, n. e. c.....	223,355	74,476	74,446	74,433	17,254	3,442	19,860	28,610	5,267	-----
TEXTILE FIBERS AND MANUFACTURES										
300 Cotton, unmanufactured.....	1,040,032	96,870	916,110	27,052	3,572	14	14,957	3,572	4,937	-----
310 Cotton, semimanufactures, excluding cotton rags and batting.....	123,280	38,533	79,852	4,895	2,162	-----	1,513	1,031	189	-----
320 Cotton manufactures and cotton rags and batting.....	209,722	40,855	132,916	35,951	28,715	4,182	2,470	80	499	5
324 Hemp, including manila or abaca, unmanufactured.....	60,978	59,450	70	1,458	26	-----	17	1,415	-----	-----
326 Sisal, henequen and jute, unmanufactured.....	307,926	277,440	799	29,687	210	-----	22,556	5,539	1,382	-----
328 Crude vegetable fibers, unmanufactured, n. e. c.....	27,071	21,630	5,273	168	119	-----	49	-----	-----	-----
331 Burlap and jute bagging.....	307,446	265,173	1 17,084	25,189	10,065	-----	12,356	2,029	545	194
335 Vegetable fiber semimanufactures and manufactures, n. e. c.....	137,829	107,766	10,658	19,405	7,266	-----	10,692	1,320	125	2
340 Wool, unmanufactured.....	276,260	245,510	8,484	22,266	17,436	1,137	331	3,041	321	-----
350 Wool, semimanufactures and manufactures.....	111,310	44,811	57,593	8,906	8,108	551	-----	247	-----	-----
380 Synthetic fibers and manufactures.....	121,292	46,626	74,210	456	456	-----	-----	-----	-----	-----
390 Textile products, n. e. c.....	127,797	35,667	36,666	55,464	54,455	485	422	100	-----	-----

WOOD AND PAPER

400	Logs.....	1,518,635	463,725	¹ 217,266	837,644	7,300	51,352	696,714	4,179	78,099	-----
401	Rafted logs.....	20,258,197			20,258,197	15		13,304,324	111,965	6,718,650	123,243
405	Posts, poles, and piling.....	234,444	7,501	44,842	182,101	36,437	23,143	91,059	19,657	11,667	138
408	Wood, nonmanufactured, n. e. c.....	1,528,346	209,763	³ 1,255	1,317,328	1,957	188	1,093,787	90	221,306	-----
413	Lumber and shingles.....	5,540,243	966,094	601,573	3,972,576	2,846,901	502,502	431,673	20,250	156,982	14,268
415	Box, crate, cooperage materials, plywood, veneers, and railroad ties.....	277,885	73,308	135,450	69,127	21,745	190	44,272	949	643	1,328
421	Wood manufactures, n. e. c.....	202,420	45,690	46,416	110,314	50,257	51,865	6,544	563	582	503
430	Cork and manufactures.....	152,444	137,729	2,253	12,462	1,623		22	10,808		9
440	Pulpwood.....	3,014,211	1,376,105	² 4,054	1,634,052	5,267	115,642	1,506,809	6,334		-----
441	Wood pulp.....	1,516,496	801,181	¹ 132,062	583,253	117,457	93,549	370,632		1,615	-----
445	Paper base stocks, n. e. c.....	171,245	28,146	69,329	72,770	108		73,662			-----
450	Standard newsprint paper.....	2,225,032	1,846,667	52,437	325,928	129,344	99,955	96,592		7	30
457	Paper, related products, and manufactures, n. e. c.....	2,429,229	109,785	330,647	1,988,797	844,267	427,529	696,934	10,297	6,034	3,736

NONMETALLIC MINERALS

501	Anthracite coal.....	2,657,958	32,636	177,125	2,448,197	104,170	364,582	2,946	1,891,648	84,851	-----
502	Bituminous coal and lignite.....	151,775,268	729	29,316,749	122,457,790	10,286,596	36,319,556	58,057,086	9,056,909	8,737,618	25
503	Coal and coke briquets.....	28,504	1	⁴ 570	27,933	35	27,590		308		-----
504	Coke, including petroleum coke.....	1,379,846	23	602,388	777,435	70,547	322,980	228,002	140,151	15,755	-----
505	Motor fuel and gasoline, including blending agents or anti-knock compounds of petroleum origin.....	79,589,159	166,418		79,422,741	37,146,953	5,837,629	30,390,086	4,753,503	1,227,071	67,499
506	Motor fuels and gasoline, except S. C. i.....	1,553,653		1,553,653							-----
510	Gas oil and distillate fuel oil.....	65,646,458	724,577	4,265,853	60,656,028	35,042,573	2,060,684	11,429,341	9,699,500	2,286,135	137,795
511	Petroleum, crude.....	119,655,546	43,544,848	5,524,997	70,585,701	42,695,643	305,880	24,038,822	1,397,268	2,148,088	-----
513	Kerosene.....	10,945,842	3,163	879,467	10,063,212	6,266,947	256,878	2,918,240	369,986	247,828	3,333
514	Residual fuel oil (including bunker oil).....	63,900,026	22,013,742	3,318,403	38,567,881	17,274,308	1,045,073	10,961,519	5,443,514	3,824,542	18,925
516	Petroleum asphalt.....	2,785,623	458,941	254,355	2,072,327	1,463,426	6	418,123	123,282	66,292	1,198
518	Lubricating oils and greases, except S. C. i.....	1,170,326		1,170,326							-----
519	Lubricating oils and greases.....	4,667,883	211		4,667,672	2,439,409	48,095	680,134	1,104,081	395,701	252
520	Petroleum products, n. e. c.....	7,730,339	280,533	451,395	6,998,411	5,544,955	7,160	817,618	471,594	156,459	625
522	Natural gasoline.....	532,437		89,970	442,467	379,951		61,425		1,091	-----
523	Building cement.....	4,105,820	72,755	230,363	3,802,702	687,129	1,772,373	1,122,175	153,855	37,291	29,879
526	Building, monumental, and other stone, and stone manufactures, n. e. c.....	126,863	43,698	10,517	72,648	17,162	1	19,651	909	31,529	3,396

Footnotes at end of table.

Table 23. Summary of Foreign and Domestic Waterborne Commerce, by Type of Traffic and Commodity, Calendar Year 1953—Continued

[Net traffic in tons of 2,000 pounds]

Commodity	Total	Foreign		Domestic						
		Imports	Exports	Total	Coast-wise	Lake-wise	Internal	Intra-port	Local	Intra-territory
530 Glass and glass products.....	377,018	113,631	169,194	94,193	30,243	34,251	29,307	110	108	174
540 Clays and earths.....	1,514,946	148,351	80,202	1,286,393	9,340	15,357	866,301	43,658	350,925	812
543 Brick and tile.....	650,344	10,751	95,099	544,494	77,072	74,940	382,079	464	7,243	2,696
547 Clay products, n. e. c.....	139,449	64,315	55,046	20,088	13,117	-----	2,415	-----	152	4,404
548 Gypsum or plaster rock (including gypsum cements).....	3,847,011	3,140,940	¹ 9,627	696,444	12,664	673,546	3	-----	10,144	87
550 Sulphur.....	5,173,890	37	1,386,409	3,787,444	1,879,547	169,569	1,660,006	35,901	42,421	-----
551 Limestone, crushed (not suitable for building or monumental purposes).....	29,243,094	111,384	664,140	28,467,570	724	25,561,189	2,235,676	214,698	443,579	11,704
553 Salt.....	1,182,631	135,670	133,705	913,256	225,865	467,114	218,666	-----	1,563	48
554 Sand, gravel and crushed rock, except limestone.....	54,084,129	543,172	316,861	53,224,096	8,388,278	2,122,441	30,237,617	4,328,095	8,136,675	10,990
555 Nonmetallic minerals and manufactures, n. e. c.....	2,942,941	498,467	249,521	2,194,953	106,747	457,433	824,615	150,749	655,115	294
METALS AND MANUFACTURES, EXCEPT MACHINERY AND VEHICLES										
600 Iron ore and concentrates.....	117,261,898	12,298,103	4,761,247	100,202,548	38,233	99,782,616	372,675	150	8,874	-----
601 Pig iron (including sponge iron).....	2,282,353	591,697	¹ 6,303	1,684,353	27,487	988,588	668,278	-----	-----	-----
602 Iron and steel scrap, including tin plate scrap.....	1,883,333	48,379	107,095	1,727,859	219,507	478,022	969,702	59,888	124	616
603 Iron and steel semi-finished products.....	1,449,228	113,911	108,462	1,226,855	295,860	370,571	552,619	6,078	1,298	429
604 Rolled and finished steel mill products.....	8,684,936	1,428,939	1,769,534	5,486,463	1,229,047	785,655	3,370,099	70,376	29,331	1,955
605 Iron and steel castings and forgings, including railway car and locomotive wheels, tires, and axles.....	126,709	3,320	38,702	84,687	11,038	62,244	11,253	152	-----	-----
606 Tools and basic hardware.....	152,771	67,246	35,804	49,721	35,763	17	13,794	1	80	66
607 Household, kitchen and hospital utensils, except of precious metals.....	35,123	13,206	10,695	11,222	4,131	-----	6,901	190	-----	-----
611 Metal manufactures and parts, except precious, n. e. c., except S. C. i.....	304,095	-----	304,095	-----	-----	-----	-----	-----	-----	-----
612 Metal manufactures and parts, except precious, n. e. c.....	358,246	34,376	-----	323,870	142,445	43,525	3,960	62,537	1,508	69,895

613	Manganese, including ferromanganese.....	3,905,042	3,788,148	3,735	113,159	1,042	-----	112,117	-----	-----	-----
614	Chrome, including ferrochrome.....	2,254,534	2,248,560	312	5,662	18	-----	5,644	-----	-----	-----
615	Ferroalloys, ores, and metals, n. e. c.....	36,897	2,592	24,086	10,219	511	-----	9,356	-----	352	-----
617	Aluminum ores, concentrates, and scrap.....	5,437,314	5,215,174	11,845	210,295	235	200	207,542	2,289	29	-----
618	Aluminum metal and alloys in crude and semi-fabricated forms.....	167,864	121,047	18,075	28,742	7,778	-----	19,725	1,182	57	-----
620	Copper ore, concentrates, unrefined copper and scrap.....	942,462	584,627	34,833	323,002	13,593	6,561	85,894	206,015	10,937	2
622	Refined copper in crude forms.....	548,867	219,820	110,394	218,653	5,290	-----	925	196,902	15,536	-----
624	Copper semifabricated forms.....	144,667	3,960	11,134	129,573	20,784	17,236	1,291	85,494	4,763	5
632	Copper-base alloy semifabricated forms and scrap.....	81,780	21,902	44,221	15,657	6,321	7,454	1,194	654	-----	34
640	Lead ores, concentrates, and scrap.....	290,211	261,061	5,811	23,339	5,519	-----	11,510	6,307	-----	3
642	Lead and lead-base alloys in crude and semifabricated forms.....	421,462	246,198	80,058	95,206	17,118	-----	30,558	47,515	-----	15
652	Nickel ore, concentrates, scrap, and semifabricated forms.....	48,440	33,710	12,749	1,981	1,311	-----	100	570	-----	-----
660	Tin ore, concentrates and scrap.....	108,841	91,232	6,205	11,404	1,543	-----	4,211	5,650	-----	-----
665	Tin metal in crude and semifabricated forms.....	131,269	109,079	1,861	21,329	6,433	-----	14,221	675	-----	-----
670	Zinc ore, concentrates, and scrap.....	376,454	349,196	2,451	24,807	2,414	-----	22,098	295	-----	-----
672	Zinc in crude and semifabricated forms.....	190,819	97,963	47,498	45,358	14,529	-----	7,093	21,178	2,546	12
682	Other nonferrous ores, concentrates, metals and scrap, except precious in crude and semifabricated forms.....	517,663	429,718	17,423	70,522	25,639	25,317	17,096	2,362	108	-----
690	Precious metals and precious metal manufactures.....	1,396	1,047	318	31	31	-----	-----	-----	-----	-----
MACHINERY AND VEHICLES											
700	Electrical machinery and apparatus.....	169,713	19,029	-----	150,684	107,863	8,761	23,381	2,680	7,979	20
701	Electrical machinery and apparatus, except S. C. i.....	228,048	-----	228,048	-----	-----	-----	-----	-----	-----	-----
710	Engines, turbines, and parts, n. e. c., except locomotives.....	75,852	2,098	62,783	10,971	6,186	4	4,558	-----	223	-----
722	Construction, excavating, mining and related machinery, including materials handling and conveying machinery and parts.....	736,027	-----	291,841	444,186	18,692	87,107	291,104	15,778	20,843	10,662
730	Machine tools and other metal working machinery and parts.....	17,474	16,482	-----	992	253	-----	732	5	1	1
731	Machine tools and other metal working machinery and parts, except S. C. i.....	114,807	-----	114,807	-----	-----	-----	-----	-----	-----	-----

Footnotes at end of table.

Table 23. *Summary of Foreign and Domestic Waterborne Commerce, by Type of Traffic and Commodity, Calendar Year 1953—Continued*

[Net traffic in tons of 2,000 pounds]

Commodity	Total	Foreign		Domestic						
		Imports	Exports	Total	Coast-wise	Lake-wise	Internal	Intra-port	Local	Intra-territory
740 Textile, sewing, and shoe machinery, and parts.....	78,007	25,585	50,313	2,109	1,547	-----	-----	562	-----	-----
742 Other industrial machines and parts (including pumping equipment), office machines, printing and bookbinding machinery.....	332,030	-----	227,641	104,389	58,580	11,001	27,782	6,236	702	88
745 Machinery and parts, n. e. c., except agricultural.....	32,686	32,686	-----	-----	-----	-----	-----	-----	-----	-----
770 Agricultural machinery, implements, and parts (including tractors).....	72,444	12,289	-----	60,155	3,168	43,146	8,365	480	613	4,383
773 Agricultural machinery, implements, and parts (including tractors), except S. C. i.....	285,377	-----	285,377	-----	-----	-----	-----	-----	-----	-----
780 Automobiles, trucks, and busses, excluding parts, accessories, and service equipment.....	1,252,446	33,412	-----	1,219,034	68,641	732,013	390,894	72	1,035	26,379
781 Automobiles, trucks, and busses, except S. C. i.....	578,128	-----	578,128	-----	-----	-----	-----	-----	-----	-----
782 Automobile, truck, bus, and trailer parts and accessories, and service equipment.....	192,100	2,194	-----	189,906	11,425	169,650	2,849	4,676	1,306	-----
783 Merchant vessels, other watercraft, and parts.....	116,925	1,601	-----	115,324	28,133	8	85,224	1,252	705	2
785 Merchant vessels, other watercraft, and parts, except S. C. i.....	4,156	-----	4,156	-----	-----	-----	-----	-----	-----	-----
786 Railway locomotives, cars, parts, and accessories.....	82,180	4,790	69,618	7,772	7,352	-----	-----	420	-----	-----
787 Automobile, truck, bus, and trailer parts and accessories, and service equipment, except S. C. i.....	123,720	-----	123,720	-----	-----	-----	-----	-----	-----	-----
790 Aircraft and parts, except radio equipment, including military aircraft and parts.....	40,226	173	-----	40,053	8,383	-----	31,507	59	104	-----
793 Aircraft and parts, except S. C. i.....	967	-----	967	-----	-----	-----	-----	-----	-----	-----
796 Vehicles and parts, n. e. c.....	63,712	22,988	7,485	33,239	9,543	21,598	1,585	344	133	36
CHEMICALS AND RELATED PRODUCTS										
800 Coal-tar products.....	1,901,034	402,534	-----	1,498,500	486,278	5,267	848,855	85,570	72,521	9
803 Coal-tar products, except S. C. i.....	86,683	-----	86,683	-----	-----	-----	-----	-----	-----	-----
810 Medicinal and pharmaceutical preparations.....	75,103	1,918	44,229	28,956	26,378	-----	696	1,880	-----	2

825 Sulphuric acid.....	1,216,105	12	3,330	1,212,763	18,038	-----	958,243	44,175	192,297	10
829 Industrial chemicals, except sulphuric acid, including chemical specialties.....	4,898,475	216,363	-----	4,682,112	2,030,652	7,580	1,949,713	66,532	625,070	2,565
830 Industrial chemicals, except S. C. i.....	580,399	-----	580,399	-----	-----	-----	-----	-----	-----	-----
846 Chemical specialties, n. e. c., except S. C. i.....	330,936	-----	330,936	-----	-----	-----	-----	-----	-----	-----
848 Pigments, paints, and varnishes.....	633,236	295,730	248,259	89,247	72,134	8,873	7,579	358	290	13
850 Nitrogenous fertilizers and fertilizer materials.....	1,909,583	1,707,507	77,755	124,321	42,540	-----	73,236	5,955	562	2,028
853 Phosphate fertilizer materials.....	4,651,489	109,499	2,214,336	2,327,654	2,011,751	-----	295,126	500	20,277	-----
855 Potash fertilizer materials.....	290,144	241,673	12,386	36,085	27,178	-----	4,035	4,831	41	-----
859 Fertilizer and fertilizer materials, n. e. c.....	546,963	144,291	71,601	331,071	79,329	30,597	93,231	110	22,797	105,007
860 Miscellaneous chemical products.....	349,354	2,535	-----	346,819	73,625	209,762	63,193	51	11	177
865 Miscellaneous chemical products, except S. C. i.....	27,930	-----	27,930	-----	-----	-----	-----	-----	-----	-----
MISCELLANEOUS										
900 Commodities, n. e. c.....	9,525,187	129,071	-----	9,396,116	1,140,542	1,582,912	417,512	4,132,152	1,956,284	166,714
901 Commodities, n. e. c., except S. C. i.....	261,738	-----	261,738	-----	-----	-----	-----	-----	-----	-----
920 Articles, the growth, produce or manufacture of the U. S., returned.....	67,500	67,500	-----	-----	-----	-----	-----	-----	-----	-----
925 Water.....	714,537	-----	-----	714,537	69	-----	626,587	37,020	50,561	300
926 Ice.....	331,609	-----	-----	331,609	253	270	13,864	44	317,031	147
930 Waste materials, n. e. c.....	6,824,325	-----	-----	6,824,325	25,992	16,478	24,144	1,821,516	4,936,195	-----
940 L. C. L. freight.....	2,550	-----	-----	2,550	2,550	-----	-----	-----	-----	-----
999 Department of Defense controlled cargo and Special Category commodities.....	4,127,477	-----	4,127,477	-----	-----	-----	-----	-----	-----	-----

¹ The error due to sampling is between 1 and 5 percent.

² The sampling error is 7 percent.

³ The sampling error is 17 percent.

⁴ The sampling error is 31 percent.

NOTE: Effective July 1, 1953 export tonnages of \$100-499 valued shipments were estimated based on a 10% sample. Except for the items footnoted above, the error due to sampling did not exceed one percent.

Hingham Harbor, Mass. ¹	175									
Cohasset Harbor, Mass. ²										
Scituate Harbor, Mass. ²										
Duxbury Harbor, Mass. ²										
Plymouth Harbor, Mass. ¹	21,435									
Wellfleet Harbor, Mass. ²										
Provincetown Harbor, Mass. ¹	8,953									
Pollock Rip Shoals, Nantucket Sound, Mass. ²										
Harbor of Refuge, Nantucket, Mass.	29,769			28,394	1,375					
New Bedford and Fairhaven Harbor, Mass.	388,392		3	327,979	34,399				26,011	
Fall River Harbor, Mass.	1,840,559	519,819		1,191,719	60,295	46,234	15,110		7,382	
Newport Harbor, R. I.	101,708			5,814	5,692	71,984	18,218			
Cuttyhunk Harbor, Mass. ¹	431									
Providence River and Harbor, R. I.	7,598,269	954,062	5,638	5,868,204	446,680	9,332	260,626		53,727	
Harbor of Refuge, Point Judith and * Point Judith Pond, R. I. ¹	8,469									
Harbor of Refuge, Block Island, R. I. ¹	817									
Great Salt Pond, Block Island, R. I. ¹	450									
Stonington Harbor, Conn. ¹	5,025									
New London Harbor, Conn.	910,679	396,276		262,175	211,983		32,918		7,327	
Duck Island Harbor, Conn. ²										
Branford Harbor, Conn. ²										
New Haven Harbor, Conn.	6,112,944	847,673		4,135,393	791,678		276,680		61,520	
Milford Harbor, Conn. ¹	3,181									
Bridgeport Harbor, Conn.	2,185,521	222,227		1,631,809	329,290				2,195	
Southport Harbor, Conn. ²										
Westport Harbor and Saugatuck River, Conn.	14,354			14,354						
Norwalk Harbor, Conn.	226,097			218,394					7,703	
Stamford Harbor, Conn.	727,618			696,031	31,587					
Greenwich Harbor, Conn.	80,708			79,483	806				419	
Hay (West) Harbor, N. Y. ¹	10									
Edgartown Harbor, Mass. ²										
Vineyard Haven Harbor, Mass.	38,932			36,076	2,856					
Wickford Harbor, R. I. ¹	21									
Fivemile River Harbor, Conn. ²										

Footnotes at end of table.

Table 24. Commerce at Project Harbors (Except Great Lakes) Calendar Year 1953—Continued

[In tons of 2,000 pounds]

Harbor	Total	Foreign		Domestic							
		Imports	Exports	Coastwise		Internal		Intraport	Local	Intraterritory	
				Receipts	Shipments	Receipts	Shipments			Receipts	Shipments
New York Harbor, N. Y. and N. J.:											
Unadjusted total.....	177,042,087	28,837,891	6,720,527	42,964,587	10,333,731	3,916,931	4,114,081	75,301,927	4,852,412		
Net total.....	139,395,118	28,837,891	6,720,527	42,964,587	10,333,731	3,916,931	4,114,081	37,654,958	4,852,412		
Port Chester Harbor, N. Y.....	393,102			83,357		79,176		230,569			
Milton Harbor, N. Y.....	16,729			14				16,715			
Mamaroneck Harbor, N. Y.....	114,206			98,966				15,240			
Echo Bay Harbor, N. Y.....	143,013			92,639		27,430		22,944			
New Rochelle Harbor, N. Y.....	20,037			2,679				17,358			
Long Island Sound at City Island, N. Y.....	853			550				303			
East Chester Creek, N. Y.....	1,948,990			430,155	728	190,395		1,327,712			
Westchester Creek, N. Y.....	587,100			141,624		98,261		347,215			
Bronx River, N. Y.....	675,040			491,790	14,126	96,334	4,636	68,154			
Manhasset Bay, N. Y.....	716,097			5,286	810	35,863	14,580	659,558			
Flushing Bay, N. Y.....	2,401,897			791,320	1,336	660,127	388	948,726			
Harlem River, N. Y.....	2,212,415			178,921	628	122,898		1,909,968			
Hudson River, N. Y. (lower section).	1,072,023	137,832	570	265,577	1,399	56,262	105,881	504,502			
Hudson River Channel, N. Y. and N. J.....	23,443,225	3,229,430	2,570,152	1,182,228	1,690,728	185,625	50,316	12,244,369	2,290,377		
East River, N. Y.....	18,224,953	3,528,148	809,638	3,272,741	280,806	286,156	83,680	9,595,588	368,196		
Newtown Creek, N. Y.....	7,111,036			470,684	182,469	343,271	172,829	5,907,438	34,345		
Wallabout Channel, N. Y.....	244,540				5,884			238,656			
Buttermilk Channel, N. Y.....	2,731,985	982,752	577,651	1,114	1,501	4,707	1,500	1,162,120	640		
Bay Ridge and Red Hook Channels, N. Y.....	6,243,727	1,994,323	1,448,607	707,404	298,294	9,431	6,555	1,765,831	13,282		
East Rockaway Inlet, N. Y. (Debs Inlet) ²											
Gowanus Creek Channel, N. Y.....	4,595,369	949,598	389,291	782,126	294,374	128,519	29,380	2,011,177	10,904		
Gravesend Bay, N. Y.....	494,522	1	11,464	202,112		59,727		221,218			

Table 24. Commerce at Project Harbors (Except Great Lakes) Calendar Year 1953—Continued

[In tons of 2,000 pounds]

Harbor	Total	Foreign		Domestic								
		Imports	Exports	Coastwise		Internal		Intraport	Local	Intraterritory		
				Receipts	Shipments	Receipts	Shipments			Receipts	Shipments	
Plattsburg Harbor, N. Y.....	168,156					168,156						
Port Henry Harbor, N. Y.....	11,371					11,371						
Sag Harbor, N. Y.....	16,927				16,927							
Greenport Harbor, N. Y.....	28,641	386		25,492	56					2,707		
Northport Bay and Harbor, N. Y.....	2,159,331			27,217	2,129,576					2,538		
Lake Montauk Harbor, N. Y.....	1,402									1,402		
Delaware River and tributaries, Trenton, N. J., to the sea:												
Unadjusted total.....	83,415,511	25,550,577	1,696,194	21,685,600	8,316,448	11,031,086	11,667,600	1,351,088	2,116,918			
Net total.....	73,432,216	25,550,577	1,696,194	21,685,600	8,316,448	12,715,391		1,351,088	2,116,918			
Trenton Harbor, N. J.....	459,975					458,980	995					
Bordentown-Fieldsboro, N. J.....	1,486					1,486						
Burlington-Florence-Roebling, N. J.....	956,815			13,037		906,648	37,130					
Riverton-Delanco-Beverly, N. J.....	287,168					8,618	278,550					
Penn Manor, Pa., and vicinity.....	3,429,281	84,783	* 152	3,573		81,201	3,259,572					
Bristol, Pa., and vicinity.....	25,612			21,105		4,507						
Philadelphia Harbor, Pa.....	37,288,082	13,912,574	1,456,762	8,109,091	2,239,281	4,596,888	3,694,934	1,351,088	1,927,464			
Camden-Gloucester, N. J.....	3,007,506	242,855	* 472	1,236,836	64,378	1,008,830	450,710		3,425			
Chester, Pa.....	1,268,958	150,110		58,463	40,172	1,016,376	3,837					
Marcus Hook, Pa., and vicinity.....	20,548,911	4,220,908	76,578	10,350,034	3,847,671	69,344	1,965,900		18,476			
Paulsboro, N. J., and vicinity.....	12,398,980	6,537,281	157,010	1,390,793	2,101,100	669,139	1,529,777		13,880			
Thompson Point, N. J., and vicinity.....	236,911			29,854	17,695	56,092	133,270					
Wilmington Harbor, Del.....	2,463,043	249,578	187	376,262	298	1,589,767	229,665		17,286			
Pennsgrove-Carney Point, N. J.....	374,373	152,488	52	74,283	90	144,396	3,064					
New Castle, Del., and vicinity.....	5,086			2,399		2,687						
Artificial Island, N. J. and vicinity.....	76,592		4,981	670		70,941						
Lower Delaware Bay, N. J.....	256,187					245,538	10,649					
Lower Delaware Bay, Del.....	330,545			19,200	5,763	99,648	69,547		136,387			
Baltimore Harbor and Channels, Md.....	41,807,753	16,537,107	4,837,359	7,026,494	1,402,157	1,349,331	2,266,578		8,388,727			

Queenstown Harbor, Md.....	95					95					
Claiborne Harbor, Md.....	15					15					
Tilghman Island Harbor, Md.....	8,872					5,992	2,880				
Cambridge Harbor, Md.....	84,115					77,292	6,823				
Crisfield Harbor, Md.....	54,304					44,755	9,549				
Ocean City Harbor and Inlet and Sine- puxent Bay, Md.....	7,178							7,178			
Rock Hall Harbor, Md.....	6,044					2,841	3,203				
Annapolis Harbor, Md.....	17,825					17,137	688				
Black Walnut Harbor, Md.....	435					372	63				
Washington Harbor, D. C.....	2,375,704			638		2,357,766	17,300				
Potomac River at Alexandria, Va.....	326,644	64,382	26	35,976		222,719	3,541				
Monroe Bay and Creek, Va.....	2,561			2,000	561						
Breton Bay, Md.....	15,235			8,548	6,687						
Norfolk Harbor, Va.....	24,083,192	2,320,378	6,880,581	4,891,175	4,344,219	1,835,900	3,147,284		663,655		
Channel to Newport News, Va.....	12,250,616	553,184	6,608,624	5,592	4,481,210	512,369	89,637				
Port of Richmond, Va.....	2,461,218	50,199		33,695	4,245	2,363,576	9,503				
Cape Charles City Harbor, Va.....	4,649					4,409			240		
Horn Harbor, Va.....	20,419					7,288	9,456		3,675		
Winter Harbor, Va.....	1,838					1,473	350		15		
Edenton Harbor, N. C.....	13,967					8,884	4,382		701		
Manteo (Shallowbag) Bay, N. C.....	14,383					10,004	3,901		478		
Belhaven Harbor, N. C.....	16,680					8,812	4,497		3,371		
Silver Lake Harbor, N. C.....	3,294					1,820	764		710		
Beaufort Harbor, N. C.....	44,089				1,855				42,234		
Morehead City Harbor, N. C.....	536,685	141,774	3,141	287,697	3,201	19,088	80,056		1,728		
Georgetown Harbor, S. C. (Winyah Bay).....	1,072,772	277	81,873	7	108,470	858,131	23,925		89		
Charleston Harbor, S. C.....	4,020,134	1,309,174	177,412	1,991,496	123,247	42,290	256,949	12,052	107,514		
Savannah Harbor, Ga.....	3,782,568	1,638,259	188,139	1,554,269	158,801	105,106	84,432		53,562		
Darien Harbor, Ga.....	683								683		
Brunswick Harbor, Ga.....	218,860	1,783	927	3,945		135,142	75,803		1,260		
Fernandina Harbor, Fla.....	189,070		17,280	41,232		81,281			49,277		
Jacksonville Harbor, Fla.....	4,992,309	948,022	77,327	2,628,988	128,147	298,967	715,251		195,607		
Fort Pierce Harbor, Fla.....	35,284					33,958			1,326		
Palm Beach Harbor, Fla.....	734,581	212,893	248,550	113,899	805	92,673	17,271		48,490		
Port Everglades Harbor, Fla.....	2,471,191	206,976	71,380	1,669,494	138,462	5,445	238,854	951	139,629		
Miami Harbor, Fla.....	2,621,899	211,331	46,843	729,989	23,684	299,484	283,796	341,420	685,352		
Key West Harbor, Fla.....	105,934	338	5 22	47,816		29,278	11		28,469		

Footnotes at end of table.

Table 24. Commerce at Project Harbors (Except Great Lakes) Calendar Year 1953—Continued

[In tons of 2,000 pounds]

Harbor	Total	Foreign		Domestic							
		Imports	Exports	Coastwise		Internal		Intraport	Local	Intraterritory	
				Receipts	Shipments	Receipts	Shipments			Receipts	Shipments
Canaveral Harbor, Fla.	5,492								5,492		
Eau Gallie Harbor, Fla.	139					135	4				
Melbourne Harbor, Fla.	23					23					
St. Augustine Harbor, Fla.	11,484						11,083		401		
Charlotte Harbor, Fla.	831,341		46,103		782,143	467	835		1,793		
Tampa Harbor, Fla.	9,061,058	652,477	1,986,510	3,580,297	1,454,166	65,836	346,841		974,931		
St. Petersburg Harbor, Fla.	253,040	64				252,130	129		717		
Cedar Keys Harbor, Fla.	604					74	33		497		
San Juan Harbor, P. R.	2,905,824	695,481	79,253	1,328,926	639,783					19,049	143,332
Mayaguez Harbor, P. R.	550,384	69,370	37,354	204,354	239,306						
Ponce Harbor, P. R.	764,656	132,146	161,110	229,807	238,450					122	3,021
Fajardo Harbor, P. R.	120,445	1,696	68		90,885					16,166	11,630
St. Thomas Harbor, V. I.	92,255	47,705	1,961	11,917	555					28,120	1,997
Christiansted Harbor, St. Croix, V. I.	31,002	24	22							29,439	1,517
Guayanes Harbor, P. R.	11,299									1,344	9,955
Guanica Harbor, P. R.	150,685	18,587	23,316	20,801	87,981						
Apalachicola Bay, Fla.	22,130					12,581			9,549		
Carrabelle, Fla.	1,878					641	4		1,233		
Port St. Joe Harbor, Fla.	1,943,603	8,345	1,473	1,886,408	2,043	45,334					
Panama City Harbor, Fla.	1,169,835	77,088	15,069	344,633	106,212	625,086	10		1,737		
Pensacola Harbor, Fla.	736,674	96,301	59,052	10,248	11,888	514,838	12,093	25,699	6,555		
Mobile Harbor, Ala.	13,127,633	4,050,956	1,152,343	565,015	1,760,075	1,542,330	2,148,465	263,534	1,644,915		
Pascagoula Harbor, Miss.	268,844	22,442	12		10,734	168,163	1,950		65,543		
Biloxi Harbor, Miss.	216,685					109,529	42,165		64,991		
Gulfport Harbor, Miss.	300,301	177,327	20,365	10,127	308	49,078	35,322		7,774		
Pass Christian Harbor, Miss.	347								347		
New Orleans, La.	39,691,253	4,467,317	6,025,374	702,218	5,998,371	12,385,120	7,601,059	107,154	2,404,640		
Baton Rouge, La.	15,809,843	1,223,536	839,082	920,130	5,614,116	2,894,341	4,315,933		2,705		
Minneapolis, Minn.	540,042					528,804	11,238				

St. Paul, Minn.....	1,403,599					1,260,056	110,468		33,075		
St. Louis, Mo.....	5,968,507					2,298,367	2,720,834		949,306		
Memphis, Tenn.....	3,490,896					3,003,017	478,531		9,348		
Helena, Ark.....	1,875,858					185,477	1,690,381				
Greenville, Miss.....	987,601					774,045	202,956		10,600		
Vicksburg, Miss.....	490,998		* 469			437,359	53,170				
Lake Charles, La. (Calcasieu River and Pass, La.).....	15,950,421	31,411	528,448	71,910	7,503,723	4,659,893	2,660,469		494,567		
Baudette Harbor, Minn.....	36		36								
Warroad Harbor, Minn.....	1,151					365	786				
International Falls, Minn.....	83,537	83,537									
Ranier, Minn.....	5,259	9	5,250								
Orange, Tex.....	1,221,374	11,662	13,199	9,377	134,628	492,969	546,074		13,465		
Beaumont, Tex.....	23,422,652	24,949	809,819	1,591,929	16,978,142	2,197,675	1,637,563		182,573		
Port Arthur, Tex.....	22,309,765	14,232	1,498,209	2,011,935	14,597,028	1,950,042	2,220,365		17,954		
Houston, Tex. (Houston Ship Channel, Tex.).....	44,263,704	1,609,832	4,678,825	677,682	20,417,806	3,376,252	5,754,307	182,169	7,566,831		
Texas City, Tex. (Texas City Channel, Tex.).....	14,827,298		744,464	335,767	8,016,857	4,361,848	1,368,362				
Galveston, Tex. (Galveston Channel, Tex.).....	5,112,576	348,449	2,347,250	57,005	1,430,026	484,614	445,232				
Freeport, Tex.....	4,402,113	2,812	678,322	2,625	1,600,111	1,123,454	994,789				
Port Aransas, Tex.....	10,022,693	1,319	290,963		8,533,542	153,497	1,031,790		11,582		
Corpus Christi, Tex.....	13,544,003	695,267	569,912	50,043	8,843,099	678,257	2,464,650		242,775		
Brownsville, Tex.....	992,325	238,628	348,198	44	23,574	129,659	245,666		6,556		
Port Isabel, Tex.....	899,889	6,881	576		759,092	12,797	82,426		38,117		
Rockport, Tex.....	3,170					2,770	400				
Sabine Pass Harbor, Tex.....	785					26	759				
Kansas City, Mo.....	133,494					85,564	38,889		9,041		
Nashville, Tenn.....	1,823,384					1,738,763	84,621				
Chattanooga, Tenn.....	764,929					550,413	183,216		31,300		
Knoxville, Tenn.....	822,638					802,241	3,647		16,750		
Clairton-Elizabeth, Pa.....	11,002,466					10,724,266	278,200				
Pittsburgh, Pa.....	10,949,548					7,208,807	2,810,236		930,505		
Aliquippa-Rochester, Pa.....	8,165,505					7,048,374	1,117,131				
Huntington, W. Va.....	11,045,692					2,485,679	8,531,617		28,796		
Cincinnati, Ohio.....	7,699,847					6,703,833	992,229		3,785		
Louisville, Ky.....	5,317,009					4,471,747	697,604		147,658		

Footnotes at end of table.

Table 24. Commerce at Project Harbors (Except Great Lakes) Calendar Year 1953—Continued

[In tons of 2,000 pounds]

Harbor	Total	Foreign		Domestic							
		Imports	Exports	Coastwise		Internal		Intraport	Local	Intraterritory	
				Receipts	Shipments	Receipts	Shipments			Receipts	Shipments
Mount Vernon, Ind.....	1,755,240					86,922	1,668,318				
San Diego Harbor, Calif.....	1,528,972	27,725	15,283	1,418,794	880				66,290		
Long Beach Harbor, Calif.....	5,992,431	632,214	1,949,535	1,091,862	1,915,121	368,954	18,687		16,058		
Los Angeles Harbor, Calif.....	19,661,486	2,379,411	1,989,844	6,768,566	7,979,634	22,473	372,740		148,818		
Stockton, Calif.....	1,572,026	946	540,772	32,237	206,332	782,839	8,900				
San Francisco Bay Area, Calif.:											
Unadjusted total.....	44,922,586	3,559,530	2,808,437	12,981,897	11,212,457	14,301,194		46,400	12,671		
Net total.....	37,748,789	3,559,530	2,808,437	12,981,897	11,212,457	7,150,597		23,200	12,671		
San Rafael Creek.....	73,856					73,856					
Petaluma Creek.....	295,877					295,877					
Napa River.....	155,042					155,042					
Carquinez Strait.....	8,617,425	244,328	556,704	3,309,446	2,300,557	2,206,390					
Suisan Channel.....	48,959					25,759		23,200			
Suisan Bay Channel.....	4,237,965	520,582	370,747	1,366,658	1,156,039	800,739		23,200			
San Pablo Bay and Mare Island Strait.....	5,704,187	19,526	77,068	2,638,111	1,932,114	1,037,368					
Richmond Harbor.....	13,066,294	1,738,733	630,247	3,984,427	3,934,142	2,778,679			66		
Oakland Harbor.....	4,118,517	148,933	501,140	1,114,450	783,174	1,570,748			72		
Newark Slough.....	17,301					17,301					
Alviso Slough.....	89,925					89,925					
Redwood City Harbor.....	2,547,913	99,257	8,441		664,150	1,776,065					
San Francisco Harbor.....	4,010,210	786,610	664,090	568,805	442,281	1,536,374			12,050		
San Francisco Bay Area, other ports.....	1,939,115	1,561				1,937,071			483		
Crescent City Harbor, Calif.....	301,028			185,900	113,202				1,926		
Humboldt Harbor and Bay, Calif.....	344,141		18,011	225,172	92,735				8,223		
Moss Landing Harbor, Calif.....	176,206			173,438					2,768		
Monterey Harbor, Calif.....	94,351			81,834					12,517		

Honolulu Harbor, T. H.	3,318,025	105,881	48,659	1,853,875	617,668				1,685	378,937	311,320
Hilo Harbor, T. H.	763,717	30,930	992	197,755	420,155				1,150	71,635	41,100
Kahului Harbor, Maui, T. H.	640,692	9,706	^a 4,155	153,578	379,710				76	59,433	34,034
Kaunakakai, Molokai, T. H.	195,183								8	34,095	161,080
Port Allen Harbor, Kauai, T. H.	132,925	5,909	^b 75	50,296	55,063				53	16,382	5,147
Nawiliwili Harbor, Kauai, T. H.	395,509	11,306	2,839	45,278	293,792				339	30,928	11,027
Wake Island	63,860			63,860							
Ports on Columbia and Lower Williamette Rivers:											
Portland, Oreg.	11,716,650	144,186	1,144,759	5,905,858	667,453	1,816,345	1,371,406	365,363	301,280		
Vancouver, Wash.	1,367,713	14,849	273,499	18,213	107,448	781,609	152,625	16,380	3,090		
St. Helens, Oreg.	607,210		^c 16,069		119,872	273,522	197,496		251		
Longview, Wash.	2,323,979	5,856	615,529	167,149	160,091	1,302,500	63,873		8,981		
Astoria, Oreg.	333,711	8,534	127,416	93,930		81,066	2,306		20,459		
Other ports on the Columbia River	1,007,640		3,197	611	172,362	498,595	279,842		53,033		
Total, ports on Columbia and Lower Willamette Rivers, unadjusted	17,356,903	173,425	2,180,469	6,185,761	1,227,226	4,753,637	2,067,548	381,743	387,094		
Oregon Slough, Oreg.	796,393					400,980	395,306		107		
Yaquina Bay and Harbor, Oreg.	349,626		5,894		132,843	143,171	64,132		3,586		
Willapa River and Harbor, Wash.	703,960	3,189	12,596		126,252	8,186			553,737		
Grays Harbor and Chehalis River, Wash.	1,947,129	624	58,821	165,457	162,058	553,465	125,660		881,044		
Port Gamble, Wash.	384,119		5,972		60,503	184,581	133,063				
Olympia Harbor, Wash.	1,171,867	697	20,338	35,018	158,380	445,479	357,283		154,672		
Tacoma Harbor, Wash.	4,736,121	502,729	603,247	719,043	216,695	1,152,410	804,256		737,741		
Seattle Harbor, Wash.	11,850,811	390,000	643,017	5,372,870	703,107	2,157,864	1,501,126	360,161	722,666		
Anacortes Harbor, Wash.	581,366	29,689	6,561	1,912	37,088	183,948	236,316		85,852		
Bellingham Bay and Harbor, Wash.	1,392,267	487,860	^d 61,186	33,509	20,269	483,315	163,698		142,430		
Port Angeles Harbor, Wash.	2,083,182	74,325	32,599	124,049	65,081	687,551	460,309		639,268		
Everett Harbor, Wash.	3,169,346	107,603	25,368	39,915	51,410	1,899,582	823,173		222,295		
Hammersley Inlet, Wash.	797,431					256,574	239,589		301,268		
Neah Bay, Wash.	114,149	3				5,608	100,433		8,105		
Nome Harbor, Alaska	35,544			4,031	795					19,488	11,230
Petersburg Harbor, Alaska	26,479	31		4,948	2,517				10,699	8,151	133
Ketchikan Harbor, Alaska	354,746	2,378	152	177,080	22,816				23,330	68,113	60,877
Seward Harbor, Alaska	587,201			520,410	11,165				126	11,976	43,524

Footnotes at end of table.

Table 24. Commerce at Project Harbors (Except Great Lakes) Calendar Year 1953—Continued

[In tons of 2,000 pounds]

Harbor	Total	Foreign		Domestic							
		Imports	Exports	Coastwise		Internal		Intraport	Local	Intraterritory	
				Receipts	Shipments	Receipts	Shipments			Receipts	Shipments
Sitka Harbor, Alaska	53,630	146		14,594	3,836				3,644	30,842	568
Skagway Harbor, Alaska	69,820	899	9	57,434	182					5,768	5,528
Valdez Harbor, Alaska	70,918			58,865	1,672				316	9,707	358
Cordova Harbor, Alaska	32,250	36		12,072	5,532				5,005	6,280	3,325
Juneau Harbor, Alaska	111,676	333		56,111	6,171				3,580	18,544	26,937
Whittier Harbor, Alaska	131,758			91,129	3,530					37,099	
Kodiak Harbor, Alaska	27,520			19,493	743					7,185	99
Iliuliuk Harbor, Alaska	66,714			34,852						2,102	29,760

¹ Tonnage by type of traffic not reported for projects which handle less than 25,000 tons²² No commerce reported.³ The sampling error is between 5 and 9.9 percent.⁴ The sampling error is between 10 and 19.9 percent.

NOTE: Effective July 1, 1953 export tonnages of \$100-499 valued shipments were estimated based on a 10% sample. Except for the items footnoted above, the error due to sampling did not exceed one percent.

⁵ The sampling error exceeds 100 percent.⁶ The sampling error is between 50 and 100 percent.⁷ The sampling error is between 1 and 4.9 percent.

Table 25. Commerce at Project Harbors On The Great Lakes, Calendar Year 1953 ¹

[In tons of 2,000 pounds]

Harbor	Total	Foreign				Domestic					
		Imports		Exports		Lakewise		Coastwise		Internal	Local and intraport
		Canadian	Overseas	Canadian	Overseas	Receipts	Shipments	Receipts	Shipments		
Isle Royale, Mich., Ports on ²	3,541	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Grand Marais Harbor, Minn.....	52,183	-----	-----	-----	-----	-----	52,140	-----	-----	-----	43
Beaver Bay Harbor, Minn. ²	20	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Two Harbors (Agate Bay), Minn.....	23,627,485	-----	-----	43,578	-----	207,322	23,376,570	-----	-----	-----	15
Knife River Harbor, Minn. ²	57	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Duluth-Superior Harbor, Minn. and Wis.	77,243,545	436,307	3,861	6,696,205	9,232	6,376,934	63,699,166	-----	-----	-----	21,840
Port Wing Harbor, Wis. ²	178	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Cornucopia, Wis. ²	731	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bayfield Harbor, Wis. ²	3,995	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Ashland Harbor, Wis.....	4,129,068	40,093	-----	136,636	-----	390,200	3,562,139	-----	-----	-----	-----
Ontonagon Harbor, Mich. ²	50	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Lac La Belle Harbor, Mich. ²	24	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Grand Traverse Bay Harbor, Mich. ²	243	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Keweenaw Waterway, Mich., Ports on.....	309,245	-----	-----	-----	-----	308,236	413	-----	-----	-----	596
Big Bay Harbor, Mich. ²	2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Presque Isle Harbor, Mich.....	5,161,233	3,360	-----	350,055	-----	-----	4,807,818	-----	-----	-----	-----
Marquette Harbor, Mich.....	715,622	-----	-----	35,849	-----	186,331	493,350	-----	-----	-----	92
Grand Marais Harbor of Refuge, Mich. ²	833	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Whitefish Point Harbor, Mich. ²	357	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Port of Sault Ste. Marie, Mich.....	437,769	334	-----	-----	-----	437,435	-----	-----	-----	-----	-----
Lime Island, Mich.....	163,068	-----	-----	-----	-----	163,068	-----	-----	-----	-----	-----
Drummond Island, Mich.....	2,327,323	-----	-----	82,355	-----	6,879	2,238,089	-----	-----	-----	-----
Detour, Mich.....	511,043	-----	-----	-----	-----	511,041	-----	-----	-----	-----	2
Manistique Harbor, Mich.....	352,088	-----	-----	-----	-----	139,378	212,581	-----	-----	-----	129
Gladstone Harbor, Mich.....	91,854	-----	-----	-----	-----	91,752	-----	-----	-----	-----	102
Menominee Harbor and River, Mich. and Wis.....	824,249	70,894	-----	-----	-----	681,282	71,089	-----	-----	-----	984

Footnotes at end of table.

Table 25. Commerce at Project Harbors On The Great Lakes, Calendar Year 1953 ¹—Continued

[In tons of 2,000 pounds]

Harbor	Total	Foreign				Domestic					
		Imports		Exports		Lakewise		Coastwise		Internal	Local and intraport
		Canadian	Overseas	Canadian	Overseas	Receipts	Shipments	Receipts	Shipments		
Pensaukee Harbor, Wis. ²	477										
Oconto Harbor, Wis. ²	145										
Big Suamico River, Wis. ²	360										
Green Bay Harbor, Wis.	3,345,190	135,865	24,953	3,327	12,741	2,971,554	5,381			190,879	490
Fox River, Wis.	189,372									189,372	
Sturgeon Bay, Wis.	21,611					21,044	176				391
Detroit Harbor, Wis. ²	8,861										
Jackson Harbor, Wis. ²	1,521										
Algoma Harbor, Wis. ²	4,020										
Kewaunee Harbor, Wis.	1,046,582					407,683	638,820				79
Two Rivers Harbor, Wis.	79,055					78,490					565
Manitowoc Harbor, Wis.	2,311,554	64,166		2,690		1,222,082	1,004,288	10,940			7,388
Sheboygan Harbor, Wis.	541,268	169	7,933	3		532,615					548
Port Washington Harbor, Wis.	1,129,147					1,128,816					331
Milwaukee Harbor, Wis.	8,165,023	447,776	10,186	12,774	25,155	6,337,842	1,319,073			2,096	10,121
Racine Harbor, Wis.	126,784					126,533					251
Kenosha Harbor, Wis.	25,449					25,274					175
Waukegan Harbor, Ill.	72,938					72,736					202
Port of Chicago, Ill.	38,281,685	822,521	94,063	971,382	84,170	16,374,788	4,084,680	27,784		11,568,543	4,253,754
Indiana Harbor, Ind.	20,044,665	179,532		65,518		12,350,477	7,203,001			240,154	5,983
Michigan City Harbor, Ind. ²	187										
St. Joseph River, Mich.	47,000									47,000	
St. Joseph Harbor, Mich.	431,057					383,861				47,000	196
South Haven Harbor, Mich.	45,858	18,231	11,925	29		15,457					216
Saugatuck Harbor and Kalamazoo River, Mich. ²	142										
Holland Harbor, Mich.	289,919					289,786					133

Grand Haven Harbor and Grand River, Mich.....	5,303,988			21,638		304,475	1,068,402				3,909,473
Muskegon Harbor, Mich.....	3,539,093	26,134	550	57,129	\$ 128	2,421,806	1,033,247				99
White Lake Harbor, Mich. ¹	155										
Pentwater Harbor, Mich. ²	68										
Ludington Harbor, Mich.....	3,172,593					1,883,187	1,289,306				100
Manistee Harbor, Mich.....	770,704			31,013		240,169	497,490				2,032
Frankfort Harbor, Mich.....	1,745,521					1,027,533	717,874				114
Leland Harbor, Mich. ²	822										
Traverse City Harbor, Mich.....	98,302					98,302					
Charlevoix Harbor, Mich.....	37,429					36,200	1,155				74
St. James Harbor (Beaver Island), Mich. ²	1,378										
Cheboygan Harbor, Mich.....	32,432	631				31,698					103
Alpena Harbor, Mich.....	3,115,774					507,128	2,600,391				8,255
Saginaw River, Mich., Ports on.....	3,953,397	250,788		45,171		3,450,708	62,684				144,046
Harbor Beach (Harbor of Refuge), Mich.	53,426					53,329					97
Port Huron, Mich.....	1,173,441	2,118	6,486	79,283		856,185	189,867				39,502
Marysville, Mich.....	595,296			12,043		569,016	14,237				
St. Clair, Mich.....	722,234					718,517					3,717
Marine City, Mich.....	99,952			556		94,485					4,911
Algonac, Mich.....	127,510			95,743		22,481					9,286
Port of Detroit, Mich.....	25,463,140	457,189	136,896	169,957	18,688	22,740,695	1,098,032	46,289	5,756	93,395	696,243
Put-in-Bay, Ohio ²	4,882										
Port Clinton Harbor, Ohio ²	4,006										
Toledo Harbor, Ohio.....	31,617,522	61,810	7,455	5,074,816	52,849	4,931,262	21,058,294	2,101		62,832	366,103
Monroe Harbor, Mich.....	46,017					22,096					23,921
Sandusky Harbor, Ohio.....	8,521,771	25		1,579,680		1,564	6,832,259				108,243
Huron Harbor, Ohio.....	3,587,086	309,002		5,021		2,008,894	1,263,253				916
Vermillion Harbor, Ohio ²	1,273										
Lorain Harbor, Ohio.....	11,780,986	310,487		1,381,900		8,555,391	1,321,874				211,334
Cleveland Harbor, Ohio.....	23,480,714	411,639	21,965	89,513	16,169	22,183,282	351,894			30,434	375,818
Fairport Harbor, Ohio.....	2,469,705			647,678		1,384,178	395,031				42,818
Ashtabula Harbor, Ohio.....	15,228,497	530,348		2,474,713		11,463,328	716,087				44,021
Conneaut Harbor, Ohio.....	16,058,774	72,890		407,729		15,008,500	568,387				1,268
Erie Harbor, Pa.....	7,318,112	157,156	261	910,038		4,820,734	1,201,437			9,759	218,727
Dunkirk Harbor, N. Y. ²	12,171										
Port of Buffalo, N. Y.....	22,008,987	1,617,908	3,305	587,741	3,152	16,562,222	1,903,290	22,182	1,348	775,429	532,410
Tonawanda Harbor, N. Y.....	491,075	63,403				290,769	27,069		1,639	8,718	99,477

Footnotes at end of table.

Table 25. Commerce at Project Harbors On The Great Lakes, Calendar Year 1953¹—Continued

[In tons of 2,000 pounds]

Harbor	Total	Foreign				Domestic					
		Imports		Exports		Lakewise		Coastwise		Internal	Local and intraport
		Canadian	Overseas	Canadian	Overseas	Receipts	Shipments	Receipts	Shipments		
Niagara Falls, N. Y.....	32,901						4,700			19,971	8,230
Rochester (Charlotte) Harbor, N. Y.....	866,661	9,127		842,612			14,922				
Great Sodus Bay, N. Y.....	1,607,384			605,663			1,001,716				5
Oswego Harbor, N. Y.....	2,199,030	103,647		566,266	113	1,267,848	13,807			247,302	47
Sackets Harbor, N. Y.....	34,746					16,347	5			18,393	1
Cape Vincent Harbor, N. Y. ²	31										
Ogdensburg Harbor, N. Y.....	574,574	142,163		188,503		117,076				126,832	
Morristown Harbor, N. Y. ²	4										
Waddington Harbor, N. Y.....	99,350	99,292		58							

¹ Includes Canadian and Lakewise car ferry traffic as follows:

Harbor	Lakewise		Harbor	Lakewise	
	Receipts	Shipments		Receipts	Shipments
Manistique Harbor, Mich.....	135,824	212,581	Milwaukee Harbor, Wis.....	1,158,355	1,264,320
Menominee Harbor and River, Mich. and Wis.....	105,825	70,857	Muskegon Harbor, Mich.....	523,125	349,979
Kewaunee Harbor, Wis.....	407,683	638,820	Ludington Harbor, Mich.....	1,523,288	1,289,306
Manitowoc Harbor, Wis.....	549,472	887,368	Frankfort Harbor, Mich.....	1,027,533	717,874

² Tonnage by type of traffic not reported for projects which handle less than 25,000 tons.³ The sampling error is between 20 and 49.9 percent.

NOTE: Effective July 1, 1953 export tonnages of \$100-499 valued shipments were estimated based on a 10% sample. Except for the items footnoted above, the error due to sampling did not exceed one percent.

Table 26. Commerce On Project Rivers, Canals, and Connecting Channels, United States, Calendar Year 1953

[In tons of 2,000 pounds]

River, canal, or connecting channel	Tons	Total ton-miles (000 omitted)	Miles per ton	River, canal, or connecting channel	Tons	Total ton-miles (000 omitted)	Miles per ton
RIVER				RIVER—Continued			
St. Croix River, Maine.....	18,938	320	17	Connecticut River, below Hartford, Conn.....	2,150,560	98,926	46
Lubec Channel, Maine.....	48,807	122	2	Housatonic River, Conn.....	969,806	4,849	5
Union River, Maine ¹				Westport Harbor and Saugatuck River, Conn.....	14,354	57	4
Penobscot River, Maine.....	750,257	18,669	25	Sakonnet River and Harbor, R. I.....	1,884	1	1
Kennebec River, Maine.....	194,899	4,526	23	Warren River, R. I.....	2,803	1	(*)
Saco River, Maine ¹				Mianus River and Cos Cob Harbor, Conn.....	9,528	10	1
Kennebunk River, Maine ¹				Browns Creek, N. Y.....	320		1
Josias River, Maine ¹				Hudson River, Deep Water in Upper Bay, N. Y. to Waterford, N. Y. (consolidated report).....	40,970,920	1,734,592	42
Merrimack River, Mass. ¹				Hudson River, N. Y. (mouth of Spuyten Duyvil Creek to Waterford, N. Y.).....	17,826,587	1,604,957	90
Ipswich River, Mass. ¹				Narrows of Lake Champlain, N. Y. and Vt.....	636,932	8,599	14
Annisquam River, Mass. ¹				Otter Creek, Vt. ¹			
Chelsea River, Mass.....	5,000,911	7,501	1	Great South Bay, N. Y.....	80,498	1,270	16
Mystic River, Mass.....	4,253,646	5,862	1	Jones Inlet, N. Y.....	6,623	14	2
Malden River, Mass.....	41,681	42	1	Peconic Bay and River, N. Y.....	15,131	130	9
Fort Point Channel, Mass.....	477,385	239	1	Glen Cove Creek, N. Y.....	31,375	31	1
Neponset River, Mass.....	11,685	12	1	Shark River, N. J. ¹			
Weymouth Fore River, Mass.....	1,454,799	8,602	6	Orowoc Creek, N. Y.....	2,986	3	1
Town River, Mass.....	559,107	419	1	Wappinger Creek, N. Y.....	8,946	13	1
Weymouth Back River, Mass.....	47,762	2	(*)	Shrewsbury River, N. J.....	15,071	90	6
Taunton River, Mass. ¹				Susquehanna River above and below Havre De Grace, Md.....	14,747	74	5
Providence River and Harbor, R. I.....	7,598,269	63,336	8	Elk and Little Elk Rivers, Md. ¹			
Seekonk River, R. I.....	402,211	804	2	Chester River, Md.....	86,263	2,206	25
Pawcatuck River, R. I. and Conn.....	17,359	115	7	Duck Point Cove, Md.....	1,207	1	1
Mystic River, Conn.....	202		1				
Thames River, Conn.....	610,976	8,554	14				
Connecticut River, above Hartford, Conn. ¹							

Footnotes at end of table.

Table 26. Commerce On Project Rivers, Canals, and Connecting Channels, United States, Calendar Year 1953—Continued

[In tons of 2,000 pounds]

River, canal, or connecting channel	Tons	Total ton-miles (000 omitted)	Miles per ton	River, canal, or connecting channel	Tons	Total ton-miles (000 omitted)	Miles per ton
RIVER—Continued				RIVER—Continued			
Honga River and Tar Bay, Md.....	4,533	18	4	Rancocas River, N. J.....	7,697	10	1
Delaware River, Trenton, N. J. to the Sea (consolidated report).....	74,017,739	6,229,147	84	Smyrna River, Del.....	2,637	24	9
Delaware River between Philadelphia, Pa. and Trenton, N. J.....	7,525,881	90,311	12	Woodbury Creek, N. J. ¹	758	2	3
Delaware River, Philadelphia, Pa. to the Sea.....	73,828,454	6,138,836	83	Tuckerton Creek, N. J.....			
Delaware River at Camden, N. J.....	2,358,996			Toms River, N. J. ¹			
Schuylkill River, Pa.....	14,237,257	56,949	4	St. Jones River, Del.....	9,360	9	1
Misplillion River, Del.....	25,138	302	12	Big Timber Creek, N. J.....	211,998	64	(*)
Harbor of Refuge, Delaware Bay, Del.....	196,356	295	2	Corsica River, Md.....	26,155	131	5
Cooper River, N. J.....	290,648	291	1	Tred Avon River, Md.....	62,081	621	10
Mantua Creek, N. J.....	113,047	113	1	Town Creek, Md.....	3,188	2	1
Salem River, N. J.....	70,941	284	4	La Trappe River, Md.....	8,333	29	3
Cohansey River, N. J.....	217,856	4,139	19	Choptank River, Md.....	114,947	1,447	13
Absecon Creek, N. J.....	160		3	Slaughter Creek, Md.....	255		1
Alloway Creek, N. J. ¹				Warwick River, Md.....	10,349	16	2
Appoquinimink River, Del. ¹				Nanticoke River (including Northwest Fork), Del. and Md.....	241,596	9,340	39
Broadkill River, Del. ¹				Tyaskin Creek, Md.....	9		1
Chester River, Pa. ¹				Nanticoke River at Nanticoke, Md.....	4,787	5	1
Dennis Creek, N. J. ¹				Broad Creek River, Del.....	8,007	80	10
Double Creek, N. J. ¹				Wicomico River, Md. (Eastern Shore).....	276,067	8,184	30
Goshen Creek, N. J. ¹				Lower Thoroughfare at or near Wenona, Deal Island, Md.....	1,148	1	1
Leipsic River, Del. ¹				Upper Thoroughfare, Deal Island, Md.....	6,485	4	1
Little River, Del. ¹				Broad Creek, Somerset County, Md.....	11,210	36	3
Manasquan River, N. J.....	1,292	2	2	Pocomoke River, Md.....	49,064	1,472	30
Maurice River, N. J.....	24,594	172	7	Mill Creek, Md.....	20		1
Murderkill River, Del.....	3,861	8	2	Twitch Cove and Big Thoroughfare River, Md.....	5,228	26	5
Oldmans Creek, N. J. ¹				Herring Bay and Rockhold Creek, Md.....	37		1
Raccoon Creek, N. J.....	5,014	45	9	Governors Run, Md.....	26		(*)

RIVER—Continued				RIVER—Continued			
Broadwater Creek, Md.....	123	1		Totuskey Creek, Va.....	36,404	200	6
Paris Creek, Md.....	515	1		Mulberry Creek, Va.....	5,035	2	1
Cadle Creek, Md. ¹				Urbana Creek, Va.....	12,502	6	1
Lake Ogleton, Md. ¹				Whitings Creek, Va.....	87		(*)
Middle River and Dark Head Creek, Md.....	36	3		Carter Creek, Va.....	29,735	33	1
Back Creek (Anne Arundel County), Md.....	1,249	(*)		Locklies Creek, Va.....	27,440	41	15
Fishing Creek, Calvert County, Md.....	40	1		Mill Creek, Va.....	4,214	4	1
Tangier Channel, Va.....	2,195	3		Broad Creek, Va.....	2,571	1	(*)
Starlings Creek, Va.....	10,953	7		Milford Haven, Va.....	5,567	5	1
Fishing Bay Tributaries, Dorchester County, Md.....	5,787	6		Jackson Creek, Va.....	163		1
Northeast River, Md.....	230	1		Newport News Creek, Va.....	322,480	129	(*)
Chincoteague Bay, Md., and Va.....	18,011	54		James River, Va.....	4,645,332	293	63
Manokin River, Md.....	359	1		Little River (Creek), Va.....	42,387	42	1
Anacostiac River, D. C.....	1,407,511	2,815		Hampton Creek, Va.....	344,593	965	3
Potomac River, Washington Channel, D. C.....	15,283	29		Channel from Phoebus, Va. to Deep Water in Hamp-			
Potomac River, Virginia Channel.....	952,910	4,479		ton Roads.....	1,989	2	1
Potomac River below Washington, D. C.....	3,440,001	185,760		Deep Creek, Warwick County, Va.....	2,514	5	2
Ocoquan Creek, Va.....	28	(*)		Pagan River, Va.....	18,480	74	4
Aquia Creek, Va. ¹				Nansemond River, Va.....	450,782	3,741	8
Neale Sound, Md.....	471	1		Blackwater River, Va.....	18,972	256	13
Upper Machodoc Creek, Va.....	12,689	6		Onancock River, Va.....	33,394	184	6
Nomini Creek, Va.....	9,848	31		Nandua Creek, Va.....	1,600	6	4
Smith Creek, Md.....	3,882	5		Ocohanock Creek, Va.....	1,556	6	4
Coan River, Va.....	7,545	15		Quinby Creek, Va.....	3,974	2	1
Little Wicomico River, Va.....	5,703	11		Little Machipongo River, Va.....	23,610	47	2
St. Patricks Creek, Md.....	1,188	1		Knobbs Creek, N. C.....	31,710	17	1
St. Catharines Sound, Md.....	435	1		Mattaponi River, Va.....	44,139	797	18
Bransons Cove, Va.....	3,363	(*)		Pamunkey River, Va.....	178,350	268	1
Channel to Island Creek, St. George Island, Md.....	2	1		Davis Creek, Va.....	1,612	1	1
Potomac River Tributaries.....	21,610	43		King Creek, Northampton County, Va.....	18,342	18	1
Patuxent River, Md.....	37,717	350		Oyster Channel, Va.....	26,903	24	1
Cranes Creek, Va.....	300	1		Meherrin River, N. C.....	9,373	98	10
Cockrell Creek, Va.....	82,419	123		Chowan River, N. C.....	56,116	1,607	29
Dymers Creek, Va.....	31,628	31		Perquimans River, N. C.....	6,519	71	11
Rappahannock River, Va.....	325,466	21,793		Cashie River, N. C.....	27,600	566	21
Hoskins Creek, Va.....	6,614	6		Roanoke River, N. C.....	403,569	8,753	22

Footnotes at end of table.

Table 26. Commerce On Project Rivers, Canals, and Connecting Channels, United States, Calendar Year 1953—Continued

[In tons of 2,000 pounds]

River, canal, or connecting channel	Tons	Total ton-miles (000 omitted)	Miles per ton	River, canal, or connecting channel	Tons	Total ton-miles (000 omitted)	Miles per ton
RIVER—Continued				RIVER—Continued			
Mackay Creek, N. C.	971		1	Oconee River, Ga. ¹			
Seuppernong River, N. C.	70,044	764	11	Ocmulgee River, Ga. ¹			
Stumpy Point Bay, N. C.	1,193	2	2	Fancy Bluff Creek, Ga.	19,207	86	45
Far Creek, N. C.	11,287	22	2	Satilla River, Ga.	9,411	301	32
Pamlico and Tar Rivers, N. C.	37,481	525	14	St. Marys River, Ga. and Fla.	65,544	393	6
South River, N. C.	975	2	2	St. Johns River, Fla., Jacksonville to Lake Harney ...	407,100	43,479	107
Bay River, N. C.	3,301	39	12	Miami River, Fla.	1,099,582	2,554	2
Neuse River, N. C.	26,074	261	10	Lake Crescent and Dunns Creek, Fla.	898	6	7
Smiths Creek (Pamlico County), N. C.	2,369	2	1	New River, Fla.	3,440	25	7
Swift Creek, N. C. ¹				Oklawaha River, Fla.	147	1	7
Contentnea Creek, N. C. ¹				St. Lucie Inlet, Fla.	322	1	3
Trent River, N. C.	7,387	22	3	Okeechobee Waterway, Fla.	78,576	4,389	56
Wilmington Harbor, N. C.	4,109,141	114,903	28	Manatee River, Fla.	51,423	304	6
Cape Fear River, N. C., above Wilmington	562,283	43,066	77	Withlacoochee River, Fla.	155,112	1,593	10
Northeast (Cape Fear) River, N. C.	4,413	110	25	Anclote River, Fla.	1,532	13	9
Smiths Creek (Wilmington), N. C.	500	1	1	Crystal River, Fla.	382	3	8
Black River, N. C. ¹				Homosassa River, Fla.	555	3	5
Shalotte River, N. C.	148		1	Horseshoe Cove, Fla.	237		2
Lockwoods Folly River, N. C.	32		2	Hudson River, Fla.	103		3
Waccamaw River, N. C. and S. C.	25,666	1,065	41	Kissimmee River, Fla.	1,435	7	5
Great Pee Dee River, S. C.	13,500	297	132	Little Manatee River, Fla.	104		4
Mingo Creek, S. C. ¹				Pithlachascotee River, Fla.	193	1	3
Santee River, S. C. ¹				Steinhatchee River, Fla.	506	2	4
Congaree River, S. C. ¹				Suwanee River, Fla.	107	1	5
Russell Creek, S. C. ¹				St. Marks River, Fla.	202,012	1,313	7
Beresford Creek, S. C. ¹				Apalachicola, Chattahoochee, and Flint Rivers, Ga. and Fla.	125,030	1,935	15
Abbapoola Creek, S. C.	1,163	5	5	Watson Bayou, Fla.	84,874	106	1
Savannah River below Augusta, Ga.	39,447	7,732	196	La Grange Bayou, Fla.	77,034	327	4
Altamaha River, Ga.	14,785	88	60				

RIVER—Continued		
Bayou Chico, Fla.....	57,220	63
Three Mile Creek, Ala. ¹	1,867,845	868
Chickasaw Creek, Ala.....	294,528	536
Alabama-Coosa Rivers, Ala. and Ga.....	85,159	3,994
Black Warrior, Warrior, and Tombigbee Rivers, Ala.....	2,857,217	655,253
Pascagoula River, Miss.....	34,116	752
Wolf and Jordan Rivers, Miss.....	28,360	340
East Pearl River, Miss.....	52,696	896
Bayou Coden, Ala.....	5,227	4
Bayou La Batre, Ala.....	16,947	42
Bluff Creek, Miss.....	7,011	76
Choctawhatchee River, Fla. and Ala.....	1,850	11
Escambia and Conecuh Rivers, Fla. and Ala., Excam- bia Bay, Fla.....	3,106	69
Pearl River, Miss.....	1,646	50
Chefuncte and Bogue Falia Rivers, La.....	36,773	74
Bayous La Loutre, St. Malo, and Yscloskey, La.....	44,078	684
Barataria Bay, La.....	519,782	14,239
Bayou Lafourche, La.....	2,216,534	49,186
Bayou Terrebonne, La.....	1,684,244	6,158
Bayou Little Caillou, La.....	45,169	552
Atchafalaya River, La., Morgan City to Gulf of Mexico.....	458,711	15,749
Petit Anse, Tigre and Carlin Bayous, La.....	648,972	3,358
Bayou Teche, La.....	395,585	15,719
Red River below Fulton, Ark.....	629,504	6,399
Bayou Vermillion, La.....	244,342	4,561
Mermentau River, Bayou Nezplique and Bayou Des Cannes, La.....	1,648,387	48,999
Amite River and Bayou Manchac, La.....	7,795	166
Bayou Bonfouca, La.....	24,206	218
Bayou Dupre, La.....	11,353	71
Bayou Grossetete, La.....	1,460	3
Bayou Lacombe, La.....	6,893	48
Big Pigeon and Little Pigeon Bayous, La.....	16,539	221
Tickfaw, Natalbany, Ponchatoula, and Blood Rivers, La.....	225	3

RIVER—Continued		
1 Bayou Segnette, La.....	696	5
(*) Lake Pontchartrain, La.....	827,793	16,939
2 Double Bayou, Tex.....	27,016	118
47 Trinity River, Channel to Liberty, Tex.....	379,057	4,794
230 Cedar Bayou, Tex.....	548,050	2,493
22 Clear Creek, Tex.....	52,619	489
12 Dickinson Bayou, Tex.....	387,972	4,061
17 Chocolate Bayou, Tex.....	120,163	1,838
1 San Bernard River, Tex.....	2,385,242	59,361
2 Tributary Arroyo Colorado, Tex.....	36,991	821
11 Bastrop Bayou, Tex.....	11,562	98
6 Goose Creek, Tex.....	219,306	631
23 Yazoo River, Miss.....	34,155	859
31 Mouth of Yazoo River, Miss.....	175,985	417
2 Arkansas River, Ark. and Okla.....	513,460	2,079
16 Ouachita and Black Rivers, Ark. and La.....	148,625	16,870
27 Big Sunflower River, Miss.....	4,229	110
22 Tensas River and Bayou Macon, La.....	21,365	505
4 White River, Ark., below Batesville, Ark.....	185,613	3,809
12 St. Francis and L'Anguille Rivers and Blackfish Bayou, Ark.....	9,277	221
34 Upper White River, Ark.....	75,000	300
5 Black River, Wis.....	469,383	344
40 Illinois Waterway, Ill.....	20,077,414	3,345,973
10 Minnesota River, Minn.....	434,696	5,000
19 St. Croix River, Wis. and Minn.....	7,113	163
30 Missouri River, Fort Benton to the mouth (net).....	2,542,483	79,829
21 Kansas City to the mouth.....	966,344	63,851
9 Sioux City to Kansas City.....	1,580,382	15,756
6 Fort Benton to Sioux City.....	61,843	222
2 Cumberland River, Tenn. and Ky.....	2,495,265	289,434
7 Tennessee River, Tenn., Ala., and Ky.....	7,119,227	1,020,629
13 French Broad and Little Pigeon Rivers, Tenn.....	48,250	212
13 Hiwassee River, Tenn.....	86,217	86
13 Monongahela River, Pa., and W. Va.....	33,370,457	1,598,279
13 Allegheny River, Pa., open-channel portion.....	101,275	101

Footnotes at end of table.

Table 26. Commerce On Project Rivers, Canals, and Connecting Channels, United States, Calendar Year 1953—Continued

[In tons of 2,000 pounds]

River, canal, or connecting channel	Tons	Total ton-miles (000 omitted)	Miles per ton	River, canal, or connecting channel	Tons	Total ton-miles (000 omitted)	Miles per ton
RIVER—Continued				RIVER—Continued			
Allegheny River, Pa., improved portion.....	3,590,807	70,407	20	Redwood City Harbor, Calif.....	2,547,913	10,192	4
Youghiogheny River, Pa.....	268,273	143	1	Noyo River, Calif.....	2,470		1
Muskingum River, Ohio.....	66,184	14	(*)	Bodega Bay, Calif.....	2,435	7	3
Big Sandy River, Tug and Levisa Forks, Ky. and W. Va.....	43,922	176	4	Columbia River, mouth to International Boundary (consolidated report).....	17,351,400	1,355,549	78
Kanawha River, W. Va.....	7,422,416	389,989	53	Columbia River and tributaries above Celilo Falls to McNary Lock and Dam, Oregon and Wash.....	794,874	68,464	86
Little Kanawha River, W. Va.....	73,670	161	22	Columbia River at Bonneville, Oreg.....	1,343,575	1,344	1
Kentucky River, Ky.....	91,430	8,265	90	Columbia River, Vancouver, Wash. to The Dalles, Oreg.....	2,989,574	114,360	38
Green and Barren Rivers, Ky.....	63,108	9,220	146	Columbia and Lower Willamette Rivers below Vancouver, Wash. and Portland, Oreg.....	18,474,638	1,312,976	71
Ohio River, Pittsburgh to mouth.....	62,034,303	11,757,310	190	Willamette River above Portland and Yamhill River, Oreg.....	4,449,041	125,283	28
Mississippi River, Minneapolis, Minn., to the Passes (net).....	80,099,909	23,748,959	297	Columbia Slough.....	124,126	683	6
Minneapolis, Minn., to mouth of Missouri River.....	14,741,315	2,636,795	179	Cowlitz River, Wash.....	103,386	456	4
Mouth of Missouri River to mouth of Ohio River.....	15,942,576	2,376,849	149	Clatskanie River, Oreg.....	16,414	57	4
Mouth of Ohio River to but not including Baton Rouge, La.....	24,167,091	12,024,790	498	Westport Slough, Oreg.....	239,875	168	11
Baton Rouge, La., to but not including New Orleans, La.....	35,996,484	3,281,196	91	Elokomin Slough, Wash.....	210,269	210	1
New Orleans, La., to mouth of Passes.....	52,908,486	3,429,329	65	Skamokawa Creek, Wash.....	33,764	10	(*)
San Joaquin River, Calif. (including commerce of port of Stockton, Calif.).....	1,979,597	67,579	34	Grays River, Wash.....	70,332	352	5
Sacramento River, Calif.....	1,972,059	123,718	63	Deep River, Wash.....	457,973	1,290	3
Middle River and connecting channels, Calif.....	24,884	211	8	Youngs Bay and Youngs River, Oreg.....	521,799	1,826	4
Suisun Bay Channel, Calif.....	7,417,117	62,593	8	Skipanon Channel, Oreg.....	262,372	407	2
Suisun Channel, Calif.....	48,959	734	15	Chinook Channel, Wash.....	35,662	29	1
Old River, Calif.....	227,836	7,207	32	Columbia River at Baker Bay, Wash.....	27,671	138	5
Mokelumne River, Calif.....	31,672	220	7	Tillamook Bay and Bar, Oreg.....	247,733	1,652	7
San Rafael Creek, Calif.....	73,856	258	4	Yaquina River, Oreg.....	243,214	2,189	9
Petaluma Creek, Calif.....	295,877	5,770	20	Suislaw River, Oreg.....	244,025	1,708	7
Napa River, Calif.....	155,042	2,403	16	Umpqua River, Oreg.....	725,897	7,985	11

RIVER—Continued				FEDERAL CANAL AND CONNECTING CHANNEL—Cont.			
Coos and Millicoma Rivers, Oreg.....	681,345	3,066	4	Waterway on the coast of Virginia.....	73,679	1,683	23
Coos Bay, Oreg.....	3,111,119	25,466	8	Atlantic Intracoastal Waterway between Norfolk, Va., and the St. Johns River, Fla.:.....			
Coquille River, Oreg.....	200,273	1,903	10	Norfolk engineer district via Dismal Swamp Canal Route.....	88,747	2,448	28
Lake River, Wash.....	54,897	142	3	Norfolk engineer district via Great Bridge Lock Route.....	855,405	24,083	28
Smith River, Oreg.....	41,808	251	6	Wilmington engineer district.....	1,525,561	114,417	75
Coquille River, Oreg. (entrance).....	155,546	154	1	Charleston engineer district.....	1,281,949	99,351	77
Lewis River, Wash.....	8,211	17	2	Savannah engineer district.....	744,972	40,973	55
Hoquiam River, Wash.....	535,164	4,281	8	Jacksonville engineer district.....	604,951	9,870	16
Skagit River, Wash.....	210,578	2,316	11	Channel connecting York River, Va., with Back Creek to Slaights Wharf.....	38,181	38	1
Swinomish Slough, Wash.....	496,969	4,970	10	Channel from Pamlico Sound to Rodanthe, N. C.....	1,160	1	1
Columbia River, between Wenatchee and Kettle Falls, Wash.....	193,562	17,240	9	Channel from Pamlico Sound to Avon, N. C.....	2,346	2	1
Quillayute River, Wash.....	8,480	17	2	Drum Inlet, N. C.....	246		1
Snake River, Oreg., Wash., and Idaho.....	108,748	220	2	Waterway connecting Swan Quarter Bay with Deep Bay, N. C.....	1,359	4	3
Columbia River and tributaries above McNary Lock and Dam to Kennewick, Wash.....	405,104	12,499	31	Rollinson Channel, N. C.....	2,904	8	3
Columbia River at McNary Lock and Dam, Oreg. and Wash.....	404,593	324	1	Channel connecting Thoroughfare Bay with Cedar Bay, N. C.....	1,494	2	1
FEDERAL CANAL AND CONNECTING CHANNEL				Waterway connecting Pamlico Sound and Beaufort Harbor, N. C.....	9,054	163	18
Cape Cod Canal, Mass.....	13,529,380	236,764	17	Channel from Back Sound to Lookout Bight, N. C.....	2,119	8	4
Woods Hole Channel, Mass.....	35,290	32	1	Intracoastal Waterway:			
Fire Island Inlet, N. Y.....	69,790	84	1	Jacksonville to Miami, Fla.....	560,060	33,934	61
Long Island Intracoastal Waterway.....	4,277	145	34	Miami to Key West, Fla.....	276,403	8,276	30
Inland Waterway from Delaware River to Chesapeake Bay, Del. and Md.....	8,896,865	409,256	46	Channel from Naples, Fla., to Big Marco Pass, Fla.....	28,649	275	10
New Jersey Intracoastal Waterway.....	267,915	1,247	6	Intracoastal Waterway, Caloosahatchee River to Anclote River, Fla.....	83,111	1,774	21
Absecon Inlet, N. J.....	164,767			Ozona, Fla., channel and turning basin.....	69		1
Barnegat Inlet, N. J.....	667	1	1	Gulf County Canal, Fla.....	58,193	339	6
Cape May Canal, N. J.....	2,960	12	6	East Pass Channel from the Gulf of Mexico into Choctawhatchee Bay, Fla.....	969		(*)
Cold Spring Inlet, N. J.....	24,174	24	1	Pass Manchac, La.....	48,955	343	7
Indian River Inlet and Bay, Del.....	19		1	Waterway from Empire, La., to Gulf of Mexico.....	92,589	706	8
Inland Waterway between Rehoboth Bay and Delaware Bay, Del.....	12,503	138	11				
Knapps Narrows, Md.....	6,615	7	1				

Footnotes at end of table.

Table 26. Commerce On Project Rivers, Canals, and Connecting Channels, United States, Calendar Year 1953—Continued

[In tons of 2,000 pounds]

River, canal, or connecting channel	Tons	Total ton-miles (000 omitted)	Miles per ton	River, canal, or connecting channel	Tons	Total ton-miles (000 omitted)	Miles per ton
FEDERAL CANAL AND CONNECTING CHANNEL—Cont.				FEDERAL CANAL AND CONNECTING CHANNEL—Cont.			
Waterway from Intracoastal Waterway to Bayou Dulac, La. (Bayous Le Carpe and Grand Caillou)...	305,459	4,864	16	Keweenaw Waterway, Mich. (through traffic) (see ports on).....	123,979	(⁵)	-----
Gulf Intracoastal Waterway, Plaquemine to Morgan City Route, La.	2,234,668	96,404	43	Calumet-Sag Channel, Ill. ⁴	3,575,688	(⁴)	-----
Inland Waterway from Franklin to the Mermentau River, La.	329,852	6,310	19	Chicago Sanitary and Ship Canal ⁴	14,924,536	(⁴)	-----
Lake Charles Deep Water Channel, La. ³	16,266,587	405,038	25	Detroit River, Mich. ⁴	154,322,381	(⁵)	-----
Vinton Waterway, La.	275,666	2,581	9	St. Marys Falls Canal, Mich.	128,510,232	(⁵)	-----
Cypress Bayou and Waterway between Jefferson Tex., and Shreveport, La.	5,869	53	9	Sturgeon Bay and Lake Michigan Ship Canal, Wis. (through traffic only).....	1,182,189	(⁵)	-----
Franklin Canal, La.	4,873	24	5	Grays Reef Passage, Mich.	6,415,349	(⁵)	-----
Waterway from White Lake to Pecan Island, La.	17,561	32	2	The Dalles-Celilo Canal, Oreg. and Wash.	785,445	7,854	10
Gulf Intracoastal Waterway between Apalachee Bay, Fla., and the Mexican Border.....	41,726,687	7,334,006	176	Multnomah Channel, Oreg.	1,172,708	7,047	6
Sabine-Neches Waterway, Tex.	56,763,206	1,292,883	23	Canals and locks at Willamette Falls, Oreg.	1,714,246	514	1
Anahuac Channel, Tex.	478,755	2,308	5	Waterway connecting Port Townsend Bay and Oak Bay, Wash.	510,454	459	1
Channel to Palacios, Tex.	122,592	1,700	14	Lake Washington Ship Canal, Wash.	2,062,249	-----	-----
Channel from Pass Cavallo to Port Lavaca, Tex.	372,980	7,487	20	STATE CANAL			
Channel to Aransas Pass, Tex.	120,029	762	6	New York State Barge Canal.....	4,497,231	705,467	157
Port Aransas (Aransas Pass)-Corpus Christi Waterway, Tex.	23,391,694	324,367	14	Miami Canal, Fla.	50	-----	1
Brazos Island Harbor, Tex. (Waterway).....	1,849,897	20,279	11	Innerharbor Navigation Canal, La.	3,045,624	6,287	2
				New Basin Canal, La.	8,439	8	1

* Less than 0.5 mile.

¹ No commerce reported.² Ton-miles (868,000) included also in Mobile Harbor.³ Included in Gulf Intracoastal Waterway between Apalachee Bay, Fla., and the Mexican border.⁴ Included in Illinois Waterway.⁵ Included in Table 28.⁶ Includes 114,168,482 tons of through traffic which is also reported under St. Marys Falls Canal, Mich.

Table 27. *Ton-mileage of Freight Carried On Inland Waterways of the United States, By System, Calendar Year 1953*
(Includes Deep Draft waterway Traffic)

System	Ton-miles	System	Ton-miles
Atlantic coast rivers.....	¹ 13,138,311,000	Canals and connecting channels ²	10,784,685,000
Gulf coast rivers.....	¹ 4,242,101,000	Great Lakes system ³	127,383,073,000
Pacific coast rivers.....	4,533,243,000		
Mississippi River system, including Ohio River and tributaries.....	42,357,919,000	Total.....	202,439,332,000

¹ Includes approximately 3.4 billion ton-miles on Atlantic coast rivers and 3 billion ton-miles on gulf coast rivers not included in previous years.

² Except Great Lakes.

³ Does not include traffic between foreign ports.

Table 28. Ton-mileage of Freight Carried on the Great Lakes System During the Calendar Year 1953
(Prepared by Great Lakes Regional Statistical Office, Detroit, Michigan)

[000 omitted]

Area	Area totals	Foreign				Domestic							
		Overseas		Canadian		Lakewise		Coastwise		Internal		Local and intraport	
		Receipts and ship-ments	Through	Receipts and ship-ments	Through	Receipts and ship-ments	Through	Receipts and ship-ments	Through	Receipts and ship-ments	Through	Receipts and ship-ments	Through
Lake Superior.....	41,515,257	5,022		4,100,067		37,409,025						1,143	
St. Marys River.....	7,476,778		825	142,363	764,811	52,030	6,516,748					1	
Lake Michigan, including the Port of Chicago (Chicago Harbor, North Branch, South Branch, Sanitary Ship Canal, Calumet-Sag Channel and Calumet Harbor and River).....	19,779,142	81,464		950,623		18,353,555		11,159		303,984	760	77,597	
Lake Huron.....	30,018,458		69,744	493,822	2,955,169	3,154,452	23,327,688		6,835		6,288	4,460	
St. Clair River, including Channels in Lake St. Clair.....	7,167,734	367	16,239	46,739	668,152	84,841	6,341,068		1,584		1,457	7,287	
Detroit River.....	3,981,339	3,423	9,033	48,816	368,673	381,824	3,159,769	1,145	861	2,055	792	4,854	94
Lake Erie, including Upper Niagara River.....	15,749,075	21,216	98,780	2,042,468	979,794	12,398,047	66,903	834	17,642	34,823	26,290	62,278	
Welland Canal.....	340,950		14,907	5,889	289,955		10,676		2,256		17,267		
Lake Ontario, including Lower Niagara River.....	976,748	6	87,788	473,110	216,824	77,780	11,484		11,783	754	97,216	3	
St. Lawrence River, between St. Regis, Quebec, and Lake Ontario.....	377,592		63,507	76,467	221,323	7,240				9,055			
Total.....	127,383,073	111,498	360,823	8,380,364	6,464,701	71,918,794	39,434,336	13,138	40,961	350,671	150,070	157,623	94

Table 29. Comparative Statement of Traffic on the Mississippi River System,
Calendar Years 1944-53

[Net traffic]

Year	Foreign, coastwise, and lakewise traffic					Inland traffic	Grand total
	Foreign		Coastwise and lakewise		Total		
	Imports	Exports	Receipts	Shipments			
	Short tons						
1944.....	3,271,769	3,643,427	1,205,343	1,842,907	9,963,446	91,377,342	101,340,788
1945.....	3,114,176	5,393,865	955,895	3,997,962	13,461,898	82,081,437	95,543,335
1946.....	2,410,911	4,840,498	748,581	7,174,518	15,174,508	80,473,695	95,648,203
1947.....	3,453,607	6,160,617	1,029,266	9,459,411	20,102,901	97,871,034	117,973,935
1948.....	3,923,775	5,575,973	975,878	10,430,431	20,906,057	104,531,685	125,437,742
1949.....	3,748,128	6,002,776	754,802	11,650,512	22,156,218	100,157,384	122,313,602
1950.....	4,394,899	5,175,659	1,768,211	12,109,245	23,448,014	114,696,857	138,144,871
1951.....	5,068,826	6,801,168	2,022,946	12,168,821	26,061,761	128,575,280	154,637,041
1952.....	5,514,590	7,172,663	1,240,570	11,312,494	25,240,317	132,432,759	157,673,076
1953.....	5,761,852	6,899,628	2,056,613	12,104,932	26,823,025	142,568,510	169,391,535
	Ton-miles (000 omitted)						
1944.....	359,552	468,533	261,093	287,737	1,376,915	19,004,643	20,381,558
1945.....	340,228	667,905	204,331	644,899	1,857,363	17,737,830	19,595,193
1946.....	260,381	608,207	82,256	1,197,297	2,148,141	16,210,079	18,358,220
1947.....	374,846	748,806	144,631	1,470,505	2,738,788	20,740,265	23,479,053
1948.....	481,890	698,651	145,035	1,726,475	3,052,051	24,871,700	27,923,751
1949.....	502,600	770,060	98,279	1,874,795	3,245,734	24,153,321	27,399,055
1950.....	599,288	642,802	264,351	1,809,737	3,316,178	30,281,638	33,597,816
1951.....	692,411	864,969	368,393	1,824,879	3,750,652	33,003,533	36,754,185
1952.....	799,448	906,866	160,952	1,896,783	3,764,049	33,302,941	37,066,990
1953.....	826,018	908,660	320,052	2,013,549	4,068,279	38,289,640	42,357,919

Table 30. Comparative Statement of Traffic on the Mississippi River from Minneapolis, Minn., to the Mouth of Passes, Calendar Years 1944-53

[Net traffic]

Year	Foreign, and coastwise, traffic					Inland traffic	Grand total
	Foreign		Coastwise		Total		
	Imports	Exports	Receipts	Shipments			
	Short tons						
1944.....	3,271,769	3,643,427	1,205,343	1,842,907	9,963,446	34,707,870	44,671,316
1945.....	3,090,082	5,342,647	955,895	3,997,962	13,387,186	30,581,655	43,968,841
1946.....	2,388,613	4,802,820	748,581	7,174,518	15,114,532	26,193,943	41,308,475
1947.....	3,429,355	6,085,993	1,029,266	9,459,411	20,004,025	31,422,539	51,426,564
1948.....	3,898,084	5,503,714	975,878	10,430,431	20,808,707	36,339,561	57,148,268
1949.....	3,721,137	5,964,259	754,802	11,650,512	22,090,710	37,232,198	59,322,908
1950.....	4,338,216	5,109,063	1,768,211	12,109,245	23,324,735	43,597,859	66,922,594
1951.....	5,051,927	6,740,653	1,957,927	11,812,139	25,562,646	46,948,044	72,510,690
1952.....	5,476,431	7,109,446	988,341	10,876,441	24,450,659	53,133,897	77,584,556
1953.....	5,702,564	6,864,925	1,622,348	11,612,487	25,802,324	54,297,585	80,099,909
	Ton-miles (000 omitted)						
1944.....	359,552	468,533	261,093	287,737	1,376,915	8,710,185	10,087,100
1945.....	340,274	668,212	204,331	644,899	1,857,716	8,646,998	10,504,714
1946.....	260,359	607,981	82,256	1,197,297	2,147,893	8,210,346	10,358,239
1947.....	374,813	748,358	144,631	1,470,505	2,738,307	10,774,164	13,512,471
1948.....	481,864	698,362	147,049	1,773,782	3,101,057	13,625,881	16,726,938
1949.....	502,573	769,879	98,279	1,874,795	3,245,526	13,028,225	16,273,751
1950.....	599,232	642,487	264,332	1,809,737	3,315,788	16,035,840	19,351,628
1951.....	692,322	864,620	368,078	1,821,569	3,746,589	17,246,527	20,993,116
1952.....	799,412	906,551	158,620	1,892,479	3,757,062	17,128,758	20,885,820
1953.....	825,931	908,487	313,991	1,968,149	4,016,558	19,732,401	23,748,959