

THE ECONOMIC IMPACTS OF THE PORT OF PITTSBURGH

*Prepared for:
Port of Pittsburgh Commission
February 23, 2004*

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EXECUTIVE SUMMARY

The Port of Pittsburgh covers 200 miles of waterways and river terminals. It ranks as the 2nd busiest inland port in the nation. Because of the perceived importance of the river system as a key economic catalyst for the entire Western Pennsylvania region, the Port of Pittsburgh Commission retained the services of Martin Associates to measure the local and regional economic impacts generated by the river terminals and industries dependent upon the movement of cargo on the Ohio, Allegheny and Monongahela rivers.¹

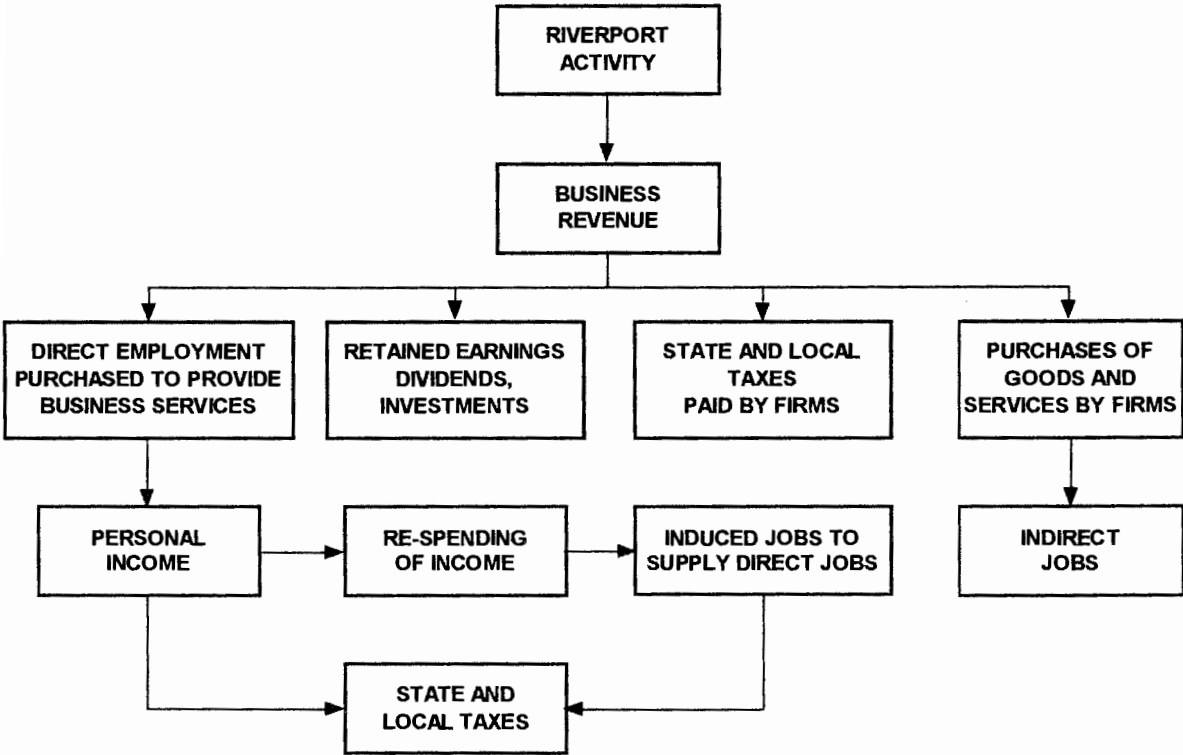
SUMMARY OF METHODOLOGY

The river system within the Port of Pittsburgh Commission District provides low cost transportation for raw materials, intermediate products, and final products consumed and/or produced by industries located in the Pittsburgh region. Key commodities moving on the river system include metallurgical coal that is used in the production of coke (which is ultimately used in steel production); steam coal that is used by the power plants along the river system; chemicals and petrochemicals that move from Louisiana and Texas that are used by local chemical companies for the production of such products as chemical products, antifreeze, plastics, sealants, and dye; sand and gravel that is used in the production of cement; and petroleum products that are distributed to local gasoline stations, to households for heating, and to the Pittsburgh International Airport for aviation fueling. In addition, the river provides recreational and sightseeing opportunities.

The flows of the economic impacts generated by the river system activity within the Port of Pittsburgh Commission District are demonstrated graphically in Exhibit E-1. As this exhibit indicates, the river system activity initially generates business revenue to the firms supplying services to the cargo and recreational activity on the river system, as well as to industrial users of the river system. This revenue is used to purchase employment creating direct jobs to provide the services, to pay stockholders and for retained earnings, to purchase goods and services from local firms, as well as national and international firms, creating indirect jobs with these firms. Taxes are also paid from this revenue.

¹The Port of Pittsburgh Commission was created to promote the commercial use, development and competitiveness of the inland waterway system and to integrate the system into the economic, recreational, environmental and intermodal future of southwestern Pennsylvania.

Exhibit E-1
Flows of Economic Impacts Generated by
Riverport Activity



The employees hired by the firms receive wages and salaries, personal income, a portion of which is saved, while another portion is used to buy goods and services such as food, housing, clothing, health care, etc. These purchases create a re-spending impact throughout the economy, known as the personal income multiplier. As a result of these local purchases, additional jobs, known as induced jobs, are created in the local economy. Local purchases by firms generate indirect jobs in the local economy, and finally, taxes are paid by the individuals employed due to the river system activity.

As demonstrated by this chart, four types of impacts are measured:

- Jobs
- Employee earnings
- Business revenue
- State and local taxes

With respect to jobs, three types of job impacts are measured. These are direct, induced, and indirect jobs. The job impacts are defined as follows:

- Direct jobs are those jobs with local firms providing support services to the river system activity, and include jobs with river terminals, towing companies, marine construction/barge and tug repair firms, warehouses, government agencies such as the U.S. Army Corps of Engineers, marinas, and trucking companies and railroads moving cargo between the river terminals and the users and/or producers of the cargo moving on the river system. Also, included as direct jobs are jobs with industrial users of the river system that are directly dependent upon the river system to ship and receive cargo. These direct jobs would suffer immediate dislocation if river system activity were to cease in the Port of Pittsburgh Commission District.
- Induced jobs are jobs created locally and throughout the regional economy due to purchases of goods and services by those directly employed by river system activity. These induced jobs are with grocery stores, the local construction industry, retail stores, health care providers, local transportation services, schools, local and county government agencies, etc., and would also be discontinued if river system activity were to cease.
- Indirect jobs are those jobs generated in the local economy as the result of local purchases by the firms directly dependent upon river system activity. These jobs include jobs in local office supply firms, equipment and parts suppliers, maintenance and repair services, telecommunications, etc.

The employee earnings consist of wages and salaries and include a re-spending effect (local purchases of goods and services by those directly employed), while business revenue consists of total business receipts by firms providing services in support of the river system activity. No revenue impacts are estimated for industrial users of the river system, since the revenue generated by the industrial users is created by the sale of products and services by these firms, which are driven by the demand for the product, not by the use of the river system. State and local taxes include taxes paid by individuals, as well as firms dependent upon the river system activity.

The study is based on interviews with about 220 firms providing services to the cargo and barges moving on the river system as well as those providing recreational services on the river system. These firms represent more than 95 percent of the firms in the Port of Pittsburgh river system community, underscoring the defensibility of the study. Furthermore, the impacts generated can be traced back to the individual firm. The data collected from the interviews were then used to develop operational models of the river system activity on each of the three rivers within the Port of Pittsburgh Commission District -- the Monongahela, Ohio and Allegheny Rivers.

No input-output models were used in this study to estimate employment multiplier impacts, but instead, re-spending models were developed using actual consumption patterns of Pittsburgh area residents. Similarly, actual local purchase patterns of the firms dependent upon river system activity were used to estimate indirect impacts. As a result, in order to ensure defensibility, the impacts estimated in this report are conservative by design.

SUMMARY OF IMPACTS GENERATED BY THE RIVER SYSTEM ACTIVITY WITHIN THE PORT OF PITTSBURGH COMMISSION DISTRICT

The economic impacts generated by the river system activity within the Port of Pittsburgh Commission District are summarized, by river segment, in Exhibit E-2.

Exhibit E-2
Summary of the Economic Impacts Generated by
the River System Activity

<u>IMPACT CATEGORY</u>	<u>ALLEGHENY</u>	<u>MONONGAHELA</u>	<u>OHIO</u>	<u>PORT DISTRICT</u>
JOBS				
Direct - port	2,832	5,802	6,253	14,887
Users - shippers/consignees	9,120	8,953	12,119	30,192
Indirect	47,309	49,474	52,751	149,534
<u>Induced</u>	<u>6,948</u>	<u>7,627</u>	<u>8,689</u>	<u>23,264</u>
Total	66,209	71,856	79,812	217,877
INCOME (\$1,000)				
Direct	\$602,402	\$634,386	\$915,645	\$2,152,433
Re-spending	\$612,523	\$645,044	\$931,027	\$2,188,594
<u>Indirect</u>	<u>\$1,874,608</u>	<u>\$1,726,294</u>	<u>\$2,378,453</u>	<u>\$5,979,355</u>
Total	\$3,089,533	\$3,005,724	\$4,225,125	\$10,320,382
LOCAL PURCHASES (\$1,000)	\$2,709,129	\$2,837,830	\$3,505,422	\$9,052,381
BUSINESS REVENUE (\$1,000) (Excludes value of products and production)	\$37,424	\$475,907	\$359,820	\$873,151
STATE & LOCAL TAXES (\$1,000)	\$305,864	\$297,567	\$418,287	\$1,021,718
FEDERAL TAXES (\$1,000)	\$654,981	\$637,213	\$895,727	\$2,187,921
RELATED JOBS				5,975

Specifically, the river system activity generated the following impacts in 2002:

1. EMPLOYMENT IMPACTS

217,877 direct, induced and indirect jobs are generated by the river system activity within the Port of Pittsburgh Commission District. Approximately 37 percent of these jobs were created by activity on the Ohio River, followed by 33 percent of the jobs generated by activity on the Monongahela River.

These 217,877 jobs generated by river system activity represent nearly 17 percent of the total private sector employment in the ten county area within the Port of Pittsburgh Commission District.

Of the 217,877 total jobs generated, 45,079 jobs are directly generated by the river system activity. Sixty-seven percent of these direct jobs are held by employees of industrial users of the river system, such as with steel plants, chemical plants, coal mines and power plants. The remaining 33 percent of the jobs are held by employees of firms providing service to the river

system, including river terminals, trucking firms, railroads, towing companies, government agencies such as the U.S. Army Corps of Engineers, and warehousing.

The 45,079 directly employed workers receive wage and salary earnings, which are then used to purchase \$2.2 billion of goods and services such as housing, clothing, food, transportation services and automobiles, and health care services. These consumption purchases support an additional 23,264 induced jobs in the regional economy.

The firms employing the 45,079 directly employed workers also make local purchases. Based on the interviews, the firms dependent on the river system in the Port of Pittsburgh Commission District annually purchase \$9.1 billion of goods and services from local industries, which generates 149,534 indirect jobs with local firms supplying these purchases.

Of the 45,079 direct jobs, 12,851 jobs are generated directly by the handling of specific commodities moving on the river system. These are jobs with river terminals, towing firms, trucking firms, warehouses, etc. Exhibit E-3 shows that metallurgical coal moving on the river system generates the largest number of direct jobs, followed by the movement of steel products, petroleum, steam coal and chemicals.

Exhibit E-3
 Distribution of Direct Transportation Related Jobs by Commodity
 (Excludes Dependent Users)

<u>COMMODITY</u>	<u>ALLEGHENY</u>	<u>MONONGAHELA</u>	<u>OHIO</u>	<u>PORT DISTRICT</u>
Steel	1,760	489	335	2,584
Met Coal		2,596	1,197	3,793
Coke	70	47	5	122
Chemicals	170	450	714	1,334
Lime	230	9		239
Sand & Gravel	13	286	242	541
Salt	65		77	142
Petro	7	297	1,597	1,901
Limestone	24	20	139	183
Fertilizer		16	83	99
Grain	92			92
Misc Bulks	12	82	105	199
Steam Coal	161	332	1,129	1,622
<u>Unallocated</u>	<u>228</u>	<u>1,178</u>	<u>630</u>	<u>2,036</u>
TOTAL	2,832	5,802	6,253	14,887

The direct job impacts are also estimated by industry. For example, the 3,793 jobs dedicated to handling metallurgical coal are added with the employees of the steel mills and coking plants to estimate the impact of the river system on the local steel industry. Exhibit E-4 provides the distribution of the direct jobs by industry, and shows that more than 17,600 direct jobs are generated to support the regional steel industry. These jobs include jobs with the towing firms, trucking companies, and river terminals, as well as with production workers in the steel mills that are supported by the coke input produced by coal moving on the river system. Similarly, the river system generates about 6,050 direct jobs in support of the local coal mine industry.

Exhibit E-4
 Distribution of River System-Generated
 Direct Jobs by Local Industry

Industry	Direct User Jobs
Steel	17,610
Utilities	2,014
Chemicals	334
Agri-business	278
Coal Mines	6,050
Cement	386
Plastics	3,464
Lime	56
Total	30,192

During the interview process, each firm was asked to provide a breakdown of their employees by zip code of residence. Based on these distributions, it is estimated that about 26 percent of the 45,079 direct jobs are held by residents of Beaver County. The job distribution by county for activity generated by each river segment has also been estimated.

2. ECONOMIC VALUE OF THE RIVER SYSTEM TO THE PITTSBURGH REGION

In 2002 the economic value of the river system consists of the nearly \$900 million of business revenue earned by local firms providing services to the cargo and recreational activity on the river system, about \$1.0 billion in state and local taxes, approximately \$2.2 billion in Federal taxes, nearly \$2.2 billion of wages and salaries paid to the 45,079 directly employed workers, about \$2.2 billion re-spending impact in the local economy, the \$6.0 billion of wages and salaries paid to the indirect job holders and the \$9.1 billion of local purchases by the firms dependent on the river system.

The \$873 million of local business revenue is received by the trucking firms and railroads moving the cargo to and from the river terminals, the towing companies carrying the cargo on the river system, the river terminals handling and storing the cargo, marinas and tourboat services, and the marine construction and tug and barge repair firms operating on the river system.

The 45,079 directly employed workers received \$2.2 billion in wages and salaries, which represents an average salary of about \$47,748. This salary is nearly 40 percent greater than the average salary paid to workers in the 10 county area within the Port of Pittsburgh Commission District, and, as a result, the jobs generated by the river system activity will tend to support greater economic activity than other regional jobs, since these jobs will generate a greater level of local purchases, and hence induced jobs.

Because of the local purchases by those directly employed, nearly \$2.2 billion of local consumption expenditures and personal income were generated in the local economy, supporting the 23,264 induced jobs.

The firms dependent upon the river system made \$9.1 billion of local purchases for maintenance and repair services, supplies, professional services, communications services and transportation services (excluding barge transportation). These local purchases supported the 149,534 indirect jobs.

Finally, \$1.0 billion of state and local taxes were generated by river system activity within the Port of Pittsburgh Commission District. In addition, the activity supported \$2.2 billion of Federal taxes.

3. TRANSPORTATION SYSTEM BENEFITS

In addition to the jobs, income, revenue and taxes generated by the river system, the use of barge transportation also provides several benefits to the regional transportation system.

Barge transportation provides a low cost means of transportation for raw materials, intermediate products and final products. Low cost transportation is particularly important to primary industries such as the steel and petrochemical industries, since these industries use as inputs raw materials that are highly sensitive to transportation costs.

To estimate the average cost savings for the key commodities moving on the river system for which a surface transportation alternative exists (rail or truck for either the current routing or for a different routing), the next least costly routing by a surface mode was identified from the interviews with each key river system user. In many cases the power plants and coking facilities did not have rail access, and hence if the river system were not available for barge transportation, these facilities would not exist in the Pittsburgh region. Several receivers of coal by barge reported higher transportation costs if trucking were used in lieu of barging. They report trucking costs would at least double or quadruple. A shift from barge to truck on a current 50-mile barge trip would nearly triple freight costs from \$1.75/ton to \$4.75/ton. The freight cost would almost quadruple for West Virginia coal destined for the Pittsburgh area. A \$4.00/ton barge rate would increase to \$14.50/ton by truck. The freight costs of coke now barged to Pittsburgh from the Gulf Coast would experience significant freight increases if diverted to truck or rail. One receiver of metal products barged from New Orleans indicated the cost of trucking would result in freight increasing from \$11.00/ton to \$33.00/ton. Receivers of sand & gravel in the Pittsburgh area stated trucking costs for local product are double the local barge cost and the trucking cost for product delivered from outside the Port of Pittsburgh Commission District are triple the barge cost.

Based on these cost savings, it is unlikely that such industries as petrochemicals, plastics and steel would have located in the Pittsburgh region. Furthermore, if the river transportation were not available to these industries it is likely that such industries would leave the region.

The use of barge transportation also provides an environmental benefit over truck transportation to the Pittsburgh region. Based on data provided by the Pennsylvania Department of Environmental Protection, Bureau of Air Quality, it is estimated that emission levels of hydrocarbons, nitrous oxide, and carbon monoxide generated by barge transportation are 6.5 percent of the levels emitted by truck transportation. Therefore, as more cargo is diverted from truck to barge transportation, air quality in the Pittsburgh area should improve, other factors held constant.

Finally, the use of barge transportation provides cost savings for highway and roadway pavement repairs. It is estimated by the Federal Highway Administration, Pavements Division, that the cost of roadway repair ranges from \$.05 to \$.20 per truck mile. As a result, the more traffic that can be diverted from truck to barge, the costs of road maintenance to the state and local municipalities will be reduced.

COMPARISION WITH 1998 STUDY

Martin Associates conducted a similar study of the economic impacts for the Port of Pittsburgh in 1998, and since the same methodology was used, for the most part, direct comparisons can be made between the current study and the 1998 study. Total tonnage moving in the Port District peaked in 2000. This reflects changing national economic conditions as well as the contraction of the manufacturing sector, and in particular the steel industry in the Pittsburgh region. Tonnage moving via terminals in the Port of Pittsburgh Commission District fell by nearly 900,000 tons over the period, from 52.9 million tons in 1998 to 52.1 million tons in 2002.

As a result of the decline in tonnage since 1998, the number of direct jobs with surface transportation and the river system services sector fell by 3,528 jobs. The major factor contributing to the change in these direct jobs is due to the closing of a major employer on the river system. The largest job loss was on the Monongahela River, and this reflects the shutdown of LTV operations on the Monongahela River. This shutdown impacted direct jobs both with shippers/consignees as well as terminal operator jobs associated with coal shipments and receipts as well as steel movements on that river system. In addition, in 2002 the jobs with industrial parks not dependent upon the river system for either transportation or other uses were counted as related jobs. In 1998, 800 jobs with industrial parks were counted as direct jobs. In 2002, jobs with industrial parks grew to nearly 6,000 jobs, and these are counted as related jobs.

Exhibit E-5
Comparison of Impacts

<u>IMPACT CATEGORY</u>	<u>2002</u>	<u>1998</u>	<u>CHANGE</u>
JOBS			
Direct Port Sector*	14,887	18,415	(3,528)
Direct Shipper/Consignee	30,192	34,509	(4,317)
Indirect	149,534	89,406	60,128
<u>Induced</u>	<u>23,264</u>	<u>35,332</u>	<u>(12,068)</u>
Total	217,877	177,662	40,215
INCOME (\$1,000)			
Direct	\$2,152,433	\$2,114,520	\$37,913
Re-spending	\$2,188,594	\$2,051,084	\$137,510
<u>Indirect</u>	<u>\$5,979,355</u>	<u>\$2,166,490</u>	<u>\$3,812,865</u>
Total	\$10,320,382	\$6,332,094	\$3,988,288
LOCAL PURCHASES (\$1,000)	\$9,052,381	\$6,758,102	\$2,294,279
BUSINESS REVENUE (\$1,000) (Excludes value of products and production)	\$873,151	\$624,842	\$248,309
STATE & LOCAL TAXES (\$1,000)	\$1,021,718	\$696,299	\$325,419
* Industrial park jobs were included with shippers/consignees in 1998 and are counted as related in 2002			

Induced jobs also fell despite the increase in personal direct income and the re-spending impact. This loss reflects the increased productivity in the supplying/support industries (resulting in a lower number of induced jobs per dollar of local purchases).

Direct personal income grew by \$37.9 million over 1998 levels, but when controlling for inflation since 1998, the personal income actually fell in constant dollars by about 8 percent, reflecting the decline in direct jobs. The re-spending and consumption impact grew by \$137.5 million, reflecting a larger multiplier impact in 2002 vs. 1998. The growth in the income multiplier as developed by the Bureau of Labor Statistics reflects the fact that a smaller portion of local purchases are leaking out of the Commonwealth of Pennsylvania in 2002 than was the case in 1998. As a result, the respending impact increased at a greater rate than direct personal income.

Business revenue grew by nearly \$250 million, a 26 percent increase in constant dollars, reflecting a growth in truck and rail rates over time.

Local purchases by the dependent users (shippers/consignees) increased by \$2.3 billion, resulting in a growth of 60,128 indirect jobs. This growth in indirect purchases reflects the inclusion of the purchases of raw materials consumed by the dependent users (shippers/consignees). These purchases were not included in the 1998 study.

Finally, state and local taxes increased by \$325.4 million, a 32 percent increase in constant dollars.

CONCLUSION

The analysis of the economic impacts generated by river system activity within the Port of Pittsburgh Commission District underscores the importance that the river system has played in the economic growth and development of the Pittsburgh region. The river system not only generates about 17 percent of the total private sector employment in the ten county region, the jobs generated by the river system have a greater economic leverage than the average job in this ten county region, due to the high wages and salaries paid by these jobs.

Without the low cost transportation provided by the river system, it is unlikely that the area industry would have initially located in the area. Furthermore, in order to retain these industries, as well as attract new industries into the region, it is critical that the river system be continually maintained and increased efficiencies of river transportation should be targeted. These efficiencies include, decreased locking times, improved river terminal handling productivity, and increases in the size of barge tows operating on the system.

I. OVERVIEW OF THE ECONOMIC IMPACT ANALYSIS

This chapter describes the overall impact approach to measuring the economic impacts generated by activity at river terminals and marinas located along the Allegheny, Monongahela, and Ohio River system within the Port of Pittsburgh Commission District. This District consists of the counties of Allegheny, Armstrong, Beaver, Butler, Fayette, Greene, Indiana, Lawrence, Washington and Westmoreland. The impacts are estimated for river activity in calendar year 2002, and are estimated for each of the three river segments. In addition to quantifying the baseline impacts of the river activity in the Port of Pittsburgh Commission District, separate economic impact models have been developed for each river segment. These models can be used in evaluating the sensitivity of impacts to changes in cargo activity (by type of cargo), inland origins/destinations of commodities, new commodities, loss of commodities, changes in the size of barge tows, the opening of new river terminals, the closing of river terminals, annual updates and the impacts of lock and dam replacements. The models can also be used to assess the economic impacts of market strategies and of new industry location.

The methodology used in this analysis of river traffic economic impacts has been developed by Martin Associates and has been used to estimate the economic impacts of the Port of Pittsburgh in 1995 and 1998. In addition, Martin Associates has used the same methodology to estimate the economic impacts of seaport, riverport and lakeport activity at more than 150 United States and Canadian ports, including:

<i>Philadelphia</i>	<i>Seattle</i>
<i>South Jersey Port Corp.</i>	<i>Tacoma</i>
<i>Wilmington, DE</i>	<i>Portland, OR</i>
<i>Baltimore</i>	<i>Vancouver, WA</i>
<i>Virginia Port Authority</i>	<i>Longview</i>
<i>North Carolina State Ports Authority</i>	<i>Duluth/Superior</i>
<i>Brunswick, GA</i>	<i>Chicago</i>
<i>Port Everglades</i>	<i>Milwaukee</i>
<i>Gulfport</i>	<i>Burns Harbor</i>
<i>Baton Rouge</i>	<i>Detroit</i>
<i>Houston</i>	<i>Erie</i>
<i>Corpus Christi</i>	<i>Thunder Bay</i>
<i>Long Beach</i>	<i>Vancouver, BC</i>
<i>Los Angeles</i>	<i>Montreal</i>
<i>Oakland</i>	<i>Halifax</i>

Because a consistent methodology has been used by Martin Associates to measure the economic impacts of the Port of Pittsburgh in 2002, direct comparisons can be made between the impacts generated by the river activity at the terminals within the Port of Pittsburgh Commission District in 1998 and the current impacts.

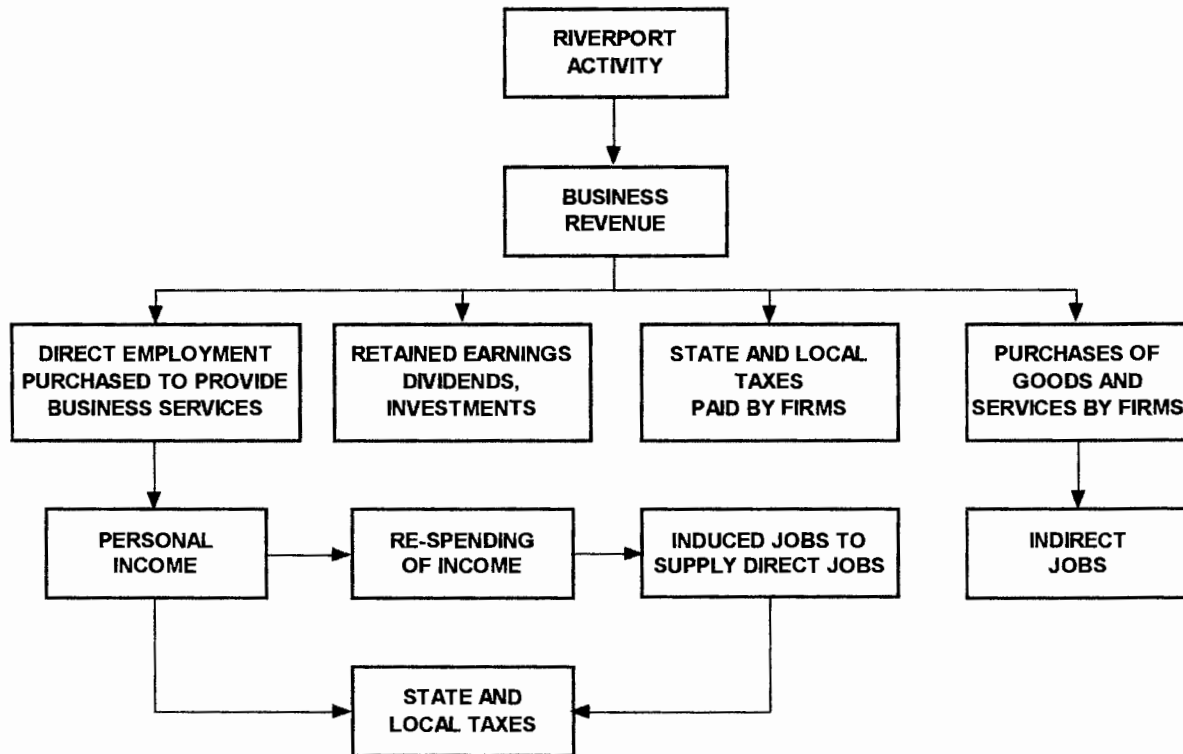
The remainder of this chapter presents an overview of the economic impact analysis and consists of the following sections:

- Flow of economic impacts generated by river activity through the local and regional economies
- The structure of the Port of Pittsburgh economic impact analysis
- Summary of the methodology
- Commodities included in the analysis.

1. **FLOW OF IMPACTS GENERATED BY RIVER ACTIVITY AT THE PORT OF PITTSBURGH**

Cargo, barge and recreational activity at a riverport contribute to the local and regional economy by generating business revenue to local and national firms providing barge and cargo handling services at the marine terminals, and recreational boating services at the public and private marinas. These firms, in turn, provide employment and income to individuals, and pay taxes to state and local governments. Furthermore, firms dependent upon the river system for the receipt and shipment of raw materials and products also receive revenue from the sales of final goods and products. Exhibit I-1, on the following page, shows how activity at river terminals generates impacts throughout the local, state and national economies. As this exhibit indicates, the impact of a riverport on a local, state or national economy cannot be reduced to a single number, but instead, the maritime activity creates several impacts. These are the revenue impact, employment impact, personal income impact, and tax impact. Exhibit I-1 shows graphically how river system activity generates the four impacts.

Exhibit I-1
Flow of Economic Impacts Generated by
Riverport Activity



1.1 Business Revenue Impact

At the outset, river activity along the Allegheny, Ohio and Monongahela Rivers generates business revenue for firms which provide services at the river terminals such as barge transportation, off-loading and loading barges, marine construction work, barge fleet services, trucking firms, railroads and warehousing. Also, manufacturing firms dependent upon the river system for the shipment and receipt of raw materials, intermediate products, and final products receive revenue from the sales of goods and products. This business revenue impact is dispersed throughout the economy in several ways. It is used to hire people to provide the services, to purchase goods and services, and to make Federal, state and local tax payments. The remainder is used to pay stock-holders, retire debt, make investments, or is held as retained earnings. It is to be emphasized that the only portions of the revenue impact that can be definitely identified as remaining in the local economy are those portions paid out in salaries to local employees, for local purchases by individuals and businesses directly dependent on the river system, in contributions to state and local taxes, and in revenue received by those local firms providing support services to the cargo and recreational activity on the river system.

Revenue received from the sales of goods and services by firms dependent upon the river system for the shipment and receipt of goods and raw materials is not considered a river system generated revenue impact, but is instead dependent upon the final demand for the goods and services. For example, if a river dependent industry were not able to use the river system for the shipment and receipt of goods and/or raw materials, but the demand for the final product of this firm was strong, the firm could relocate to another river system or if part of a multi-firm company, could shift production to another plant. The company would still receive revenue regardless of where the production was occurring, but the local impacts in the Pittsburgh area such as jobs, local purchases and local taxes would be lost. Therefore, the revenue from the sales of products by river-dependent firms is not included as a direct economic impact of the river system. However, the jobs, personal wages and salaries income, local purchases, and state and local taxes generated by the firms dependent upon the river system for the receipt and shipment of products and/or raw materials are included as economic impacts of the river system.

1.2 Employment Impact

The employment impact of river system activity consists of three levels of job impacts.

- Direct employment impact - are jobs directly generated by river system activity. Direct jobs generated by the river system include jobs with river terminals handling the cargo, railroads and trucking companies moving cargo between inland origins and destinations and the river terminals, towing companies, barge fleeting companies, warehousing, marine construction firms providing services to the river terminals, firms shipping and receiving products and raw materials by the river system (including steel plants, coking plants, chemical producers, coal mines), etc. It is to be emphasized that these are classified as directly generated in the sense that these jobs would experience near term dislocation if the river activity within the Port of Pittsburgh Commission District were to be discontinued.
- Induced employment impact - are jobs created throughout the local economy because individuals directly employed due to river system activity spend their wages locally on goods and services such as food, housing and clothing. These jobs are held by residents located throughout the region, since they are estimated based on local and regional purchases.
- Indirect Jobs - are jobs created locally due to purchases of goods and services by firms, not individuals. These jobs are estimated directly from local purchases data supplied to Martin Associates by the nearly 220 companies interviewed as part of this study, and include jobs with local office supply firms, maintenance and repair firms, parts and equipment suppliers, utilities, communications firms, etc. It is to be emphasized that special care was taken to avoid double counting, since the current study counts certain jobs as direct, which are often classified as indirect by other approaches, notably the input/output model approach.

1.3 Personal Earnings Impact

The personal earnings impact is the measure of employee wages and salaries (excluding benefits) received by individuals directly employed due to the river system activity within the Port of Pittsburgh Commission District. Re-spending of these earnings throughout the regional economy for purchases of goods and services is also estimated. This, in turn, generates additional jobs -- the induced employment impact. This re-spending throughout the region is estimated using a regional personal earnings multiplier, which reflects the percentage of purchases by individuals that are made within the Pittsburgh region. The re-spending effect varies by region -- a larger re-spending effect occurs in regions that produce a relatively large proportion of the goods and services consumed by residents, while lower re-spending effects are associated with regions that import a relatively large share of consumer goods and services (since personal earnings "leak out" of the region for these out-of-regional purchases).

1.4 Tax Impact

Federal, state and local tax impacts are tax payments to the Federal, state and local governments by firms and by individuals whose jobs are directly dependent upon and supported (induced jobs) by river system activity.

2. IMPACT STRUCTURE

The four types of economic impacts are created throughout various business sectors of the regional economy. Specifically, three distinct economic sectors are impacted as a result of river system activity. These are the:

- Surface Transportation Sector
- River System Services Sector
- Users of the River System

Within each sector, various participants are involved. Separate impacts are estimated for each of the participants. A discussion of each of the economic impact sectors is provided below, including a description of the major participants in each sector.

2.1 The Surface Transportation Sector

The surface transportation sector consists of both the railroad and trucking industries. The trucking firms and railroads are responsible for moving the various raw materials and products between the river terminals and the inland origins and destinations. For example, coal is moved from the mines to the river terminals by rail, truck or conveyor systems. The coal moves by barge to another river terminal, where it is unloaded and used for such purposes as coke production or power generation. For the most part, the destinations for coal are located on the river and are, in fact, river terminals. After the coke is produced, it is trucked or railed to area

steel plants, as well as to plants located on the Great Lakes. The impacts associated with these rail and truck moves are included in the surface transportation sector.²

2.2 The River System Services Sector

This sector consists of numerous firms and participants performing functions related to the activity on the river system within the Port of Pittsburgh Commission District. Included in this sector are:

- Barge Operations
- River Terminals
- Local Service Firms
- Marinas
- Federal, State, and Local Government Agencies.

A brief description of the major participants in each of these categories is provided below:

- Barge Operations - This category consists of barge owners, towing firms, and barge fleeting firms.
- River Terminals - This category consists of the river terminals handling the cargo prior to loading onto barges and after discharge. In some cases the river terminals provide a value added service such as the production of coke, while in other cases, these terminals are distribution terminals. Where possible, Martin Associates has allocated the employment in the river terminals to that portion of the river terminal activity dedicated to handling the river transported cargo, while the remainder is allocated to an industry categorization. For example, for a steel plant, the jobs associated with off-loading the coal, its storage and the production of coke at the terminal are included in the river terminal impacts. The associated jobs in the consuming steel plants that are supported by the value of the coke input (produced by the coal that moved by the river) are included with the local steel industry impact, which is part of the industrial user sector.
- Local Service Firms - Participants in this category are involved in providing support services for river transportation in the Port of Pittsburgh Commission District. Included in this category are:
 - Freight Forwarder/Customhouse Broker - In some cases, a freight forwarder/customhouse broker arranges for the freight to be delivered between the terminals and inland destinations, as well as the barge transportation. However, for the majority of cargo moving on the river system, the transportation is arranged by the shippers/consignees.

²It is to be emphasized that the surface transportation impact that occurs at river terminals outside the Port of Pittsburgh region are not included in this analysis, since these impacts would be attributed to another river system.

- Chandlers - provide the towboats with supplies (food, clothing, nautical equipment, etc.)
- Bunkering firms - provide fuel to the towboats
- Shipyards/marine construction firms - provide repairs, emergency or scheduled, as well as marine pier construction and dredging along the river system.
- Warehouse operators - store cargo after discharge or prior to loading and consolidate cargo units into shipment lots. In some cases, the river terminal provides the warehousing services.
- Government Agencies - This service category involves federal, state and local government agencies that perform services related to cargo handling and barge operations, including lock operations on the river system, as well as river maintenance. Included are jobs with the U.S. Customs, U.S. Department of Labor, U.S. Department of Agriculture, U.S. Coast Guard, and the U.S. Army Corps of Engineers.
- Marinas and Recreational Services - This service sector category includes marinas located on the river system as well as tourboat and sight seeing operations.

2.3 Industrial Users of the River System

This sector consists of local industrial users of the river system. Industries such as the steel industry, utilities industry, plastics and petrochemical industries, and coal mining are major users of the river system to ship and receive raw materials, intermediate products and finished products. For example, the coal mines are highly dependent upon the river system to ship coal to utilities and coking plants on the river system, as well as for export via Gulf Coast ports such as New Orleans and Mobile. The steel industry not only uses the coke produced from the coal transported by the river system, but also uses the river system to move steel products to other domestic locations or for export. Similarly, the steel industry uses barge transportation to receive imported alloys used in the steel production process.

The petrochemical industry in the Pittsburgh region receives petroleum products and chemicals by barge from such origins as Texas and Louisiana. Local and regional cement companies use the sand and gravel, limestone and other aggregates moving on the river system in cement production.

In measuring the impacts with users of the cargo moving on the river system, it is to be emphasized that not all jobs with these users are counted as dependent upon the river system, even though for the most part, the users would not have initially located in the Pittsburgh region without the low cost transportation provided by the river system. To estimate the direct jobs with shippers/consignees using the river system, Martin Associates established production relationships

for each user based on interviews with the dependent shippers/consignees as well as input to output relationships for the Pittsburgh area industries using data developed for this study by the U.S. Bureau of Economic Analysis, Regional Input-Output Modeling System (RIMSII). Using the steel industry as an example, production relationships between coal and coke were established, and the relationship between one ton of steel output and required coke input was next developed. Finally, production relationships were developed between steel plant employment and steel production (and, hence, coke and coal input). Therefore, the number of jobs in the regional steel industry supported by the metallurgical coal moving on the river system could be estimated.

Similarly, for coal mining, not all mining jobs with a company located in the Pittsburgh region were counted as directly dependent on the river system. Based on interviews with the mining companies moving coal on the river system, technical production relationships between production employment and coal production were developed. Based on these technical production relationships, the number of mining jobs supported by the coal tonnage moving on the river system could be estimated.

In addition to the dependent users, there are numerous industrial parks located along the river system, particularly on the Ohio and Monongahela Rivers. In some cases these parks include water dependent businesses, while other firms located in the industrial parks are not dependent upon water transportation of cargo. The employment with the water dependent firms is included with terminal operator jobs, while the jobs with the non-water dependent firms are counted as related jobs.

3. SUMMARY OF METHODOLOGY

The purpose of this section is to provide a summary of the methodological approach used to estimate the economic impacts of the river system activity within the Port of Pittsburgh Commission District.

3.1 Data Collection

The cornerstone of the Martin Associates approach is the collection of detailed baseline impact data from firms dependent upon the river system activity. To ensure accuracy and defensibility, the baseline impact data were collected from interviews with nearly 220 firms located within the Port of Pittsburgh District Commission. In most cases multiple interviews were conducted with these firms. The firms contacted represent the universe of firms in the above identified economic sectors and categories. Sources used to identify these firms include:

- Inland River Guide, published by the Waterways Journal, 1999
- Port of Pittsburgh Commission mailing lists of river terminals and other firms providing services to the barge industry

- The Southwestern Pennsylvania Freight Transportation Guidebook, compiled by the Southwestern Pennsylvania Planning Commission and the Southwestern Regional Development Council, in cooperation with the Port of Pittsburgh Commission, 1994.
- U.S. Army Corps of Engineers Navigational Charts

3.2 Direct Jobs, Income and Revenue Impacts

The results of these interviews were then used to develop the baseline direct job, revenue and income impacts for the economic sectors and job categories associated with the river system activity.

The tax impacts are estimated at the Federal, state, county and local level, based on actual per capita income tax burdens developed from the Tax Foundation for the Commonwealth of Pennsylvania.

This baseline survey data was also used to develop the operational models for each river segment, which can be used to update the impacts of river activity within the Port of Pittsburgh Commission District on an annual basis and to evaluate the impacts of changes in:

- Cargo tonnage moving on each river segment
- Tow configurations
- Surface Transportation patterns between the river terminals and the inland users or producers

The models can also be used to assess the impact of capital investment projects such as new river terminal development, shipyard development, as well as industrial development of specific parcels of riverfront land. Finally, the models can be used to assess the economic impacts of the lock and dam replacement projects.

3.3 Induced Impacts

Induced impacts are those generated by the purchases of the individuals employed as a result of maritime activity. For example, a portion of the personal earnings received by those directly employed due to activity at the marine terminals is used for purchases of goods and services, both regionally, as well as out-of-the region. These purchases, in turn, create additional jobs in the region which are classified as induced. To estimate these induced jobs, a regional personal earnings multiplier was developed from data provided by the Bureau of Economic Analysis, Regional Input-Output Modeling System. This personal earnings multiplier is used to estimate the total personal earnings generated in the Pittsburgh area as a result of the activity on the river system. A portion of this total personal earnings impact is next allocated to specific local purchases (as determined from consumption data for a typical consumer in Pittsburgh). This consumption data was developed from the U.S. Bureau of Labor Statistics, Consumer

Expenditure Survey, 2001). These purchases are next converted into retail and wholesale induced jobs in the regional economy.

Induced jobs are not estimated at lower levels of purchasing rounds (after the wholesale round) since it is not possible to trace with a sufficient degree of accuracy, geographically, where purchases at the remaining levels occur. However, about 80 percent of the consumption will likely occur at the first two rounds of purchases, which are most likely local retail and wholesale purchases.

3.4 Indirect Jobs

Indirect jobs are generated in the local economy as the result of purchases by firms that are directly dependent upon river system activity. These purchases are for goods such as office supplies and equipment, maintenance and repair services, raw materials, communications and utilities, transportation services and other professional services. To estimate the indirect economic impact, local purchases, by type of purchase, were collected from each of the river-dependent firms interviewed, including users dependent on the river system. These local purchases were then combined with employment to sales ratios in local supplying industries, developed from U.S. Bureau of Economic Analysis, Regional Input-Output Modeling System (Rims II) for the Commonwealth of Pennsylvania.

4. COMMODITIES INCLUDED IN THE ANALYSIS

The impacts generated by river cargo movements differ by commodity for several reasons. First, the origins and destinations of the cargo moving on the river system differ by commodity, which in turn has a direct effect on the distance the barges must travel on the river system and the size of the tow (number of barges in a tow). This in turn impacts jobs in the towing industry. Secondly, the surface transportation between the river terminals and the origins and destinations differ by commodity, which affects the impacts generated in the surface transportation industry serving the river system. Thirdly, the river terminals and associated employment at the terminals differ by commodity due to the type of activity that occurs at river terminals (distribution activity, value added activity, warehousing, etc.). Finally, the impacts differ by type of end-user or producer. For example, coal has an impact on the mining industry as well as in the steel and utility industries, while sand and gravel has a specific impact in the production of cement. Therefore, because the impacts associated with each commodity are unique to that commodity, the economic impact analysis was commodity specific. The impacts are estimated at the commodity level of detail for the following commodities moving on the river system:

- Metallurgical coal
- Steam coal
- Sand and gravel
- Limestone and lime
- Salt

- Chemicals
- Petroleum products
- Coke
- Steel products
- Fertilizer
- Grain
- Miscellaneous bulk cargoes

In the next chapter, the employment impacts generated by river system activity within the Port of Pittsburgh Commission District are presented. Revenue, income and tax impacts generated by the river system activity are detailed in Chapter III. In Chapter IV the transportation system benefits of the river system are discussed. Chapter V compares the economic impacts with those created by river system activity in 1998.

II. EMPLOYMENT IMPACTS

In this chapter, the employment generated by river system activity within the Port of Pittsburgh Commission's District is estimated. The chapter is organized as follows:

- First, the total regional employment that is dependent upon river system activity is summarized.
- Second, the subset of total employment that is directly supported by river system activity is described as follows:
 - The direct job impact is estimated by detailed job category, i.e., trucking, rail, towing industry, river terminal, distribution/warehousing, government agencies, marinas, etc.
 - The direct job impact is estimated for each of the key commodities/commodity groups moving on the river system.
 - The direct job impact is estimated by end user (shipper/consignees) industries.
 - The direct job impact is estimated based on the residency of those directly employed.
- The induced and indirect jobs are detailed.

1. TOTAL EMPLOYMENT IMPACT

It is estimated that 217,877 jobs are in some way supported by activity on the Monongahela, Allegheny, and Ohio River segments located within the Port of Pittsburgh Commission District. These jobs represent about 16.6% of the total employment in the ten counties included in the Port of Pittsburgh Commission District.³ Of the 217,877 jobs:

- 45,079 are directly generated by river system activity and if such activities should cease, these jobs would be discontinued over the short term. Of these directly generated jobs, 14,887 are with the providers of transportation services; moving cargo on the river system as well as between the river terminals and the end users. Another 30,192 jobs are with users of the river system – shippers and consignees using barge transportation in the Port District. These are jobs that are directly dependent upon the cargo moving on the river system.

³ In 2002, 1,311,019 people were reported as employed in the private sector in the 10 county area included in the Port of Pittsburgh Commission District, as reported by the U.S. Department of Labor, Bureau of Labor Statistics.

- 23,264 jobs (induced jobs) are supported by the \$2.2 billion of local purchases made by the 45,079 employees directly generated by river system activity. These local purchases include purchases for food, clothing, housing, transportation services, utilities, health care, etc.
- As the result of \$9.1 billion of local purchases by the firms dependent upon the river system, an additional 149,534 indirect jobs are generated in the local economy to supply maintenance and repair services, communications services, transportation equipment and parts, office supplies and professional services, etc. to the firms directly dependent upon the river system.

Exhibit II-1 shows the distribution of the job impacts by river segment. The river system activity on the Ohio River segment has the greatest regional economic impact, accounting for 79,812 total jobs, or about 37 percent of the total job impact. The river system activity on the Monongahela River has the next largest economic impact, generating 71,856 direct, induced and indirect jobs, while river system activity on the Allegheny River segment supported 66,209 direct, induced and indirect jobs in the regional economy.

Exhibit II-1
Distribution of Total Jobs by River Segment

<u>IMPACT CATEGORY</u>	<u>ALLEGHENY</u>	<u>MONONGAHELA</u>	<u>OHIO</u>	<u>PORT DISTRICT</u>
JOBS				
Direct - port	2,832	5,802	6,253	14,887
Users - shippers/consignees	9,120	8,953	12,119	30,192
Indirect	47,309	49,474	52,751	149,534
<u>Induced</u>	<u>6,948</u>	<u>7,627</u>	<u>8,689</u>	<u>23,264</u>
Total	66,209	71,856	79,812	217,877

As this exhibit shows, the largest job impact is with indirect jobs that are created to support the activity of the firms employing the directly impacted jobs. Direct jobs with users of the river system are the next largest employment impact category, followed by direct jobs with the port and river system sector.

2. DIRECT JOB IMPACTS

In 2002, it is estimated that the river system within the Port of Pittsburgh Commission District directly generated 45,079 full-time jobs for the regional economy.⁴ In this section, the 45,079 direct jobs are analyzed in terms of:

- Distribution by job category
- Distribution by commodity group
- Distribution by industrial user
- Distribution by location of residency.

These distributions are developed in more detail below.

2.1 Direct Job Impacts by Job Category

Exhibit II-2 shows the distribution of the 14,887 direct jobs generated by the river system activity for the types of firms classified in the river system services sector and the surface transportation sector. The remaining 30,192 direct jobs are with industrial users of the river system.

As Exhibit II-2 demonstrates, the majority of the non-user direct jobs are with river terminal operators and the direct jobs at river terminals are concentrated with terminals where a value added process takes place and the raw material is turned into an intermediate input for use in a local industry. For example, coking facilities on the Monongahela and Ohio Rivers, as well as coal-fired power stations, account for a major share of the 8,072 jobs with the river terminals. Other major river terminal employers include sand and gravel operations and petroleum and chemical distribution terminals.

The trucking industry is the next largest employer category, accounting for 2,421 direct jobs. The majority of trucking jobs are associated with the river activity on the Ohio River and are generated by the distribution of petroleum products to local gas stations and households, as well as the distribution of coke from the river terminals to local end users.

Direct jobs with barge operations (towing, fleetings and barge leasing) within the Port District account for the next largest employment impact, followed by government employees. These government jobs are concentrated with the Corps of Engineers who operate and maintain the locks, provide engineering and environmental services and who maintain the shipping channels. Other government jobs include jobs with the Coast Guard and U.S. Customs.

Employment with non-water dependent firms follows and includes jobs with firms that are located on the river for use of the water resources but do not necessarily receive cargo by the

⁴ Jobs are measured in terms of full-time worker equivalents. If a worker is employed only 50 percent of the time by river activity, then this worker is counted as .5 jobs.

river system. Finally, the next largest employment impact occurs with firms providing warehousing of river-borne products such as coils and other steel products.

Exhibit II-2
Distribution of Non-Industrial Direct Jobs
By Category

<u>JOB SECTOR</u>	<u>ALLEGHENY</u>	<u>MONONGAHELA</u>	<u>OHIO</u>	<u>PORT DISTRICT</u>
SURFACE TRANSPORTATION				
Rail		135	62	197
Truck	168	455	1,798	2,421
MARITIME SERVICE				
Terminal	2,166	3,454	2,452	8,072
Barge	179	251	1,026	1,456
Tourism/Marinas	20	240	8	268
Distribution	40	119	248	407
Govt & Assoc	189	317	367	873
Marine Services	10	155	105	270
Miscellaneous	4	56	59	119
NON-RIVER DEPENDENT	56	617	125	798
PORT COMMISSION		3	3	6
TOTAL	2,832	5,802	6,253	14,887

2.2 Direct Job Impacts by Commodity

Most of the 14,887 jobs generated by the transportation of cargo to and from the river by rail or truck and by providing services to cargo and barge activity on the river system can be related to the handling of specific commodities or commodity groups. Those job categories that cannot be allocated to a specific commodity include government, marine construction and ship repair, marinas and recreational activity, and some non-water dependent industries. As a result, employment in these groups was not allocated to commodity groups.

Exhibit II-3 presents the direct jobs in the surface transportation sector and the river system services sector by commodity moving on the river system. It is important to emphasize that these jobs do not include jobs with the industrial users. The distribution of the direct jobs by industry is the subject of the following section.

Exhibit II-3
 Distribution of Direct Transportation Related Jobs by Commodity
 (Excludes Dependent Users)

<u>COMMODITY</u>	<u>ALLEGHENY</u>	<u>MONONGAHELA</u>	<u>OHIO</u>	<u>PORT DISTRICT</u>
Steel	1,760	489	335	2,584
Met Coal		2,596	1,197	3,793
Coke	70	47	5	122
Chemicals	170	450	714	1,334
Lime	230	9		239
Sand & Gravel	13	286	242	541
Salt	65		77	142
Petro	7	297	1,597	1,901
Limestone	24	20	139	183
Fertilizer		16	83	99
Grain	92			92
Misc Bulks	12	82	105	199
Steam Coal	161	332	1,129	1,622
<u>Unallocated</u>	<u>228</u>	<u>1,178</u>	<u>630</u>	<u>2,036</u>
TOTAL	2,832	5,802	6,253	14,887

The majority of the jobs in the surface transportation sector and the river system services sector are generated by the movement of metallurgical coal. The coal, which originates locally, as well as from mines in West Virginia and Kentucky, is moved to river terminals in the Pittsburgh area, and is then used in the production of coke. The coke is then transported by surface transportation to steel mills in the region, as well as in Cleveland and the Chicago/Burns Harbor area.

The movement of steel products, such as coils, creates the second largest job impact. Steel products moving on the river system support about 2,600 direct jobs within the trucking industry and firms providing river transportation support services, including river terminal handling, warehousing and actual barge transportation. The steel movements on the river include steel produced locally and then transported by truck to the river terminal for either domestic consumption or for export via Gulf Coast ports such as New Orleans or Mobile. Also, foreign steel imported via the ports of New Orleans and Houston is moved into the Pittsburgh region for use in the local metal fabricating industry.

Petroleum, petro-chemicals, and chemical products from facilities located in Houston and Louisiana to chemical and plastic manufacturers in the Pittsburgh region create relatively large direct job impacts. The chemicals are off-loaded at river terminals (the majority of which are on

the Ohio River), and trucked (and sometimes railed) to local manufacturing facilities. Here, the chemicals are transformed into intermediate or final products for use in many industries, such as the plastics industry, the resins, adhesives and sealants industries, the automobile industry, the packaging industry, the production of antifreeze and explosives, steel pickling, and the manufacture of dye and paints.

Steam coal generates more than 1,600 direct jobs within the river system services sector and the surface transportation sector. The steam coal originates locally in Pennsylvania mines as well as in West Virginia and Kentucky mines and is barged to power plants located within the Pittsburgh region. For the most part, the coal is discharged directly at the power plant. A smaller portion of the steam coal that arrives by barge is trucked or railed to other power plants located out of the region such as in Northwestern Pennsylvania and Western New York. The majority of the direct jobs generated by the steam coal are at the consuming utilities located on the river system.

The movement of sand and gravel on the river system generates 541 direct jobs within the surface transportation sector and the river system services sector. The sand and gravel typically originates and is destined within the Pittsburgh region. The sand and gravel is often a product of dredging the river system, and the majority of the river movements are local to the Pittsburgh region. The sand and gravel is discharged at river terminals and then trucked to local cement producers for use in the construction industry. The majority of the jobs generated by the movement of sand and gravel on the river system are with local trucking companies distributing the sand and gravel to the cement manufacturers.

The movement of limestone generates 183 jobs with firms in the river system services sector and the surface transportation sector. The limestone originates in quarries located in the Pittsburgh area as well as in Ohio, and is moved by water to river terminals along the Monongahela and Ohio rivers. After discharge the limestone is used in various local industries, most notably in cement production. As with sand and gravel, the majority of the direct job impact generated by limestone is with the local trucking industry moving the limestone to the cement manufacturers.

The remainder of the commodities moving on the river system generates relatively small direct job impacts with the surface transportation sector and the river system services sector.

2.3 Direct Jobs by Industrial User

Exhibit II-4 shows the distribution of the industrial users of cargo moving on the river system. These firms are typically not located on the river, but instead use raw materials or intermediate products received at the terminals and moved by truck or rail to the consuming industries located in Pittsburgh. The users also include shippers who ship products or raw materials via the river system, but who do not have river terminals. These users receive their cargo via the river terminals described in the previous section.

Exhibit II-4
 Distribution of Industrial User Jobs
 Dependent upon the River System

Industry	Direct User Jobs
Steel	17,610
Utilities	2,014
Chemicals	334
Agri-business	278
Coal Mines	6,050
Cement	386
Plastics	3,464
Lime	56
Total	30,192

The majority of the direct jobs with users of the river system are with the regional steel industry, followed by jobs with coal mines, plastics manufacturers, and utilities. The concentration of jobs with the steel industry underscores the importance to the Pittsburgh region of the low cost barge transportation of raw materials, particularly metallurgical coal. Without the ability to receive raw materials by barge, the growth in the regional steel industry and chemical industry would not likely have occurred. As these users of the river system indicate, the availability of low cost river transportation is a very valuable resource to promote in future economic/industrial development of the Pittsburgh region.

2.4 Direct Jobs by Place of Residence

To underscore the geographic scope of the impacts generated by river system activity within the Port of Pittsburgh Commission District, Exhibit II-5 shows the distribution of the 14,887 direct transportation and river system services sector providers. The location of the jobs with the users could not be determined due to the fact that the user jobs are estimated from economic models, rather than direct interviews. The residence of these 14,887 directly employed individuals is based on the residency of each of the employees by zip code, as provided to Martin Associates by the firms interviewed as part of this study.⁵

As this exhibit indicates, the majority of the 14,887 direct jobs are held by residents of Beaver County, followed by jobs in Allegheny County. For the three river segments, more than 25 percent of the 14,887 direct jobs are held by residents of Beaver County. However, the distribution of the residency by county differs by river segment, as shown in the following exhibit.

⁵Because the residency distribution of the direct employees is at the Zip Code level of detail, it is also possible to estimate the direct job impacts at a municipal level of detail or by federal or state congressional district level of detail.

Exhibit II-5
 Distribution of 14,887 Direct Jobs
 Generated in the Transportation and River System Services Sectors
 by County of Residence

LOCATION	ALLEGHENY		MONONGAHELA		OHIO		PORT DISTRICT	
Pittsburgh	159.3	5.62%	197.6	3.41%	609.0	9.74%	965.9	6.49%
<i>Counties of:</i>								
Allegheny	555.8	19.62%	813.5	14.02%	968.6	15.49%	2,337.8	15.70%
Armstrong	723.9	25.56%					723.9	4.86%
Beaver					3,889.9	62.21%	3,889.9	26.13%
Butler	757.6	26.75%	13.8	0.24%	170.1	2.72%	941.5	6.32%
Fayette			1,440.9	24.83%	43.9	0.70%	1,484.8	9.97%
Greene			130.0	2.24%	16.5	0.26%	146.4	0.98%
Lawrence					104.2	1.67%	104.2	0.70%
Washington			1,916.0	33.02%	160.0	2.56%	2,076.0	13.95%
Westmoreland	334.5	11.81%	1,218.3	21.00%	11.0	0.18%	1,563.8	10.50%
Other PA	300.9	10.62%	30.4	0.52%	21.9	0.35%	353.3	2.37%
Ohio					175.6	2.81%	175.6	1.18%
West Virginia			41.5	0.72%	82.3	1.32%	123.8	0.83%
TOTAL	2,832.0		5,802.0		6,253.0		14,887.0	

3. INDUCED JOBS

The 45,079 directly employed individuals (14,887 jobs with the transportation and river system services sector and 30,192 direct jobs with shippers/consignees using the river system received \$2.2 billion of wages and salaries, a part of which was used to purchase local goods and services such as food, housing, clothing, transportation services, etc. As a result of these local purchases, 23,264 induced jobs in the regional economy were supported. Exhibit II-6 shows that the majority of the induced jobs are with municipal and county governments including educational institutions, regional social services, and business services. The next largest induced job impact is with restaurants and grocery stores, followed by induced jobs in the area construction industry.

Exhibit II-6
Distribution of Induced Jobs

Induced Service	Induced Jobs
Groceries	1,324
Restaurants	5,266
Housing	2,170
Furnishings	1,467
Apparel	1,098
Transportation	1,589
Health Care	1,998
Entertainment	1,479
Gov't/Services/Education	6,873
Total	23,264

4. INDIRECT JOBS

In addition to the induced jobs generated by purchases made by the 45,079 directly employed individuals, the firms directly dependent on the river system, including users as well as the firms in the surface transportation sector and the river system services sector, make local purchases of goods and services. These purchases by the firms dependent upon the river system generate additional local jobs -- indirect jobs. Based on the 217 interviews with the users of the river system and firms in the surface transportation sector and the firms in the river system services sector, detailed local purchase profiles were developed for each river segment. A total of \$9.1 billion of local purchases were made by these dependent firms. Combining these purchases with local jobs to sales ratios in the supplying industries, it is estimated that 149,534 indirect jobs were supported in the local and regional economy.

Exhibit II-7 shows the distribution of the 149,534 indirect jobs by the industry supplying the goods and/or services. As this exhibit shows, the majority of the indirect jobs are created with local suppliers of raw materials (less those jobs that are generated by the river transportation of the raw materials). The next largest indirect job impacts are with maintenance and repair services and parts. It is important to emphasize that the large indirect jobs impact, 149,534 jobs, reflects the fact that the major purchases by local industries are made from local and regional vendors and suppliers, rather than from out-of-state suppliers. This is likely the case since the steel industry and coal mining are the major user industries impacted by the river system, and these represent mature industries in the region. Because these industries have existed in the Pittsburgh region for a long period of time, key suppliers of goods and services to these industries have, over time, located in the Pittsburgh area to serve these industries. An area characterized by new industry

typically would display a larger "leakage" of purchases from the region, and hence a smaller indirect job impact, since local supply linkages have yet to be developed to serve a new industry.

Exhibit II-6
Indirect Jobs

Supplying Industry	Indirect Jobs
Maintenance and Repair	14,422
Support Services	6,430
Utilities	6,155
Goods and Supplies	564
Capital Purchases	3,064
Raw Materials	98,574
Fuel	816
Miscellaneous	<u>19,509</u>
Total	149,534

III. REVENUE, PERSONAL EARNINGS AND TAX IMPACTS

The cargo and recreational activity on the Monongahela, Allegheny, and Ohio Rivers within the Port of Pittsburgh Commission District generate revenue for firms providing services to the vessels and cargo handled, as well as the recreational services associated with marinas and tourboats operating on the river system. For example, revenue is received by the railroads and the trucking companies within the surface transportation sector as a result of moving cargo between inland locations and the river terminals. The firms in the river system services sector receive revenue from providing barge transportation, including linehaul barge charges, terminal loading charges, warehousing, barge leasing and barge fleeting services. In addition, revenue is received by users of the river system from the sales of cargo shipped or received via the river system (such as the sales of coal moving on the river system) and from the sales of final products and intermediate products produced with the raw materials and other intermediate inputs received via the river system (i.e., chemicals, petroleum products, coal, etc.).

Since this chapter is concerned with the revenue generated from providing **river system services**, the revenue generated by the sales of the products moving on the river system, i.e., the value of the cargo shipped or received on the river system as well as the value of shipments by users of the river system, are not included in the revenue impact. This revenue from the sales of products or the value of the cargo moving on the river system is generated by the final demand for the product, not by the use of the river system. For example, if the river system were to close to cargo traffic, but demand for plastic production remained strong, it is likely that plastic production would be transferred to other plastic manufacturing facilities in the U.S. that were owned by the same companies producing plastic in Pittsburgh. The Pittsburgh plastic plant would close, and the jobs, wages and salary income, and taxes generated by this plant would be lost from the Pittsburgh economy. However, to the extent that this production could be transferred to another plant owned by the plastics manufacturer, the impact on the overall company sales would not be impacted. However, the jobs, personal wages and salaries, taxes paid and local purchases made by the Pittsburgh plant would be lost from the regional economy. Therefore, the jobs, personal earnings, local purchases and state and local taxes associated with users of the river system are included in the economic impact measurement of the river system, but revenue from the sales of the products by the river system users is not included.

The total value of economic activity to the Pittsburgh economy that is generated by the river activity is measured in terms of:

- **Revenue** received from providing services to the river system. This is revenue received from the transport and storage of cargo moving on the river system, from providing recreational services such as marinas and sightseeing boat operations on the river system, and from providing marine construction and barge repair services. The revenue generated by providing services to the river system consists of many components. For example, gross revenue is used to pay employee salaries and taxes, it is distributed to stockholders of the companies providing the vessel and cargo handling

services, and it is used for the purchases of equipment and maintenance services. Of these components, only three can be isolated geographically with any degree of accuracy. These are the personal income component of revenue, which can be traced to geographic locations based on the residence of those receiving the income, the payment of state and local taxes, and the local purchases made by firms (including users) dependent upon the river system. The balance of the revenue is distributed in the form of payments to firms located outside the region and for the distribution of company profits to shareholders.

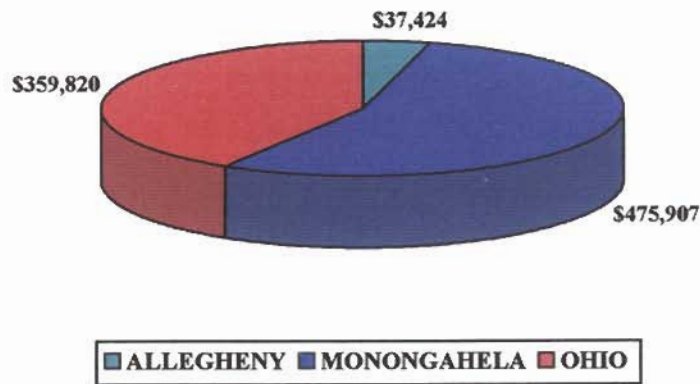
- Personal wage and salary income is received by the employees of the firms in the surface transportation services sector and the river system services sector, as well as the employees of the users of the river system that are estimated to be directly dependent upon the shipment and receipt of cargo via the river system.
- Local purchases by those directly dependent upon the river system activity create the induced jobs described in the previous chapter. These local purchases are based on the consumption patterns of those directly employed.
- Local purchases by firms dependent upon the river system create the indirect jobs also discussed in the previous chapter. These purchases include those made by firms providing services to the river system (firms in the surface transportation and river system services sectors) as well as purchases by firms using the river system for the shipment and receipt of raw materials, intermediate products and final products.
- State and local taxes are paid by the firms and employees dependent upon the river system.

In the remainder of this chapter each component of the economic value impact is described.

1. RIVER SYSTEM SERVICES REVENUE IMPACT

The activity on the river system is estimated to generate \$873.2 million of business revenue to the firms providing cargo handling and river transportation services, recreational services, and rail and truck transportation. Exhibit III-2 shows that river activity on the Monongahela River generates the largest share of the \$873.2 million business revenue impact, 54.5 percent, followed by activity on the Ohio River, which generates 41.2 percent of the revenue. The balance is generated by activity on the Allegheny River.

**Exhibit III-1
Business Revenue Generated By
River Activity, by River Segment
(Millions of Dollars)**



The majority of the business revenue is generated with railroad companies moving the cargo between the users and producers. Barge operations and terminal operators receive the next largest revenue impact, and this revenue is highest for companies moving petroleum and chemical products, reflecting the length of haul as well as the cost of the equipment to transport the products.

Exhibit III-3 shows the distribution of the revenue impact by detailed category.

**Exhibit III-3
Distribution of Business Revenue Impact
by Category
(Millions of Dollars)**

<u>JOB SECTOR</u>	<u>ALLEGHENY</u>	<u>MONONGAHELA</u>	<u>OHIO</u>	<u>PORT DISTRICT</u>
SURFACE TRANSPORTATION				
Rail	\$2,411	\$318,389	\$150,554	\$471,354
Truck	\$13,419	\$33,605	\$113,263	\$160,287
MARITIME SERVICE				
Barge/Terminal	\$10,450	\$88,915	\$74,480	\$173,845
Tourism/Marinas	\$10,000	\$11,847	\$1,245	\$23,092
Marine Services	\$1,144	\$16,658	\$14,390	\$32,192
Miscellaneous		\$6,493	\$5,888	\$12,381
TOTAL	\$37,424	\$475,907	\$359,820	\$873,151

2. PERSONAL EARNINGS IMPACT

The 45,079 directly employed individuals received \$2.2 billion of wage and salary income as the result of river system activity. This represents an average salary of \$47,748 per employee, which is nearly 40 percent greater than the \$34,390 average salary earned by all employees in the 10 county area within the Port of Pittsburgh Commission District.⁶

The personal earnings impact is estimated by multiplying the average annual earnings (excluding benefits) of each job category, i.e., truckers, towing firms, warehousemen, railroads, dependent users, marinas, etc., by the corresponding number of direct jobs in each category. The individual annual earnings in each category multiplied by the corresponding job impact resulted in \$2.2 billion in personal wage and salary earnings.

The impact of the re-spending of this direct income for local purchases is estimated using a personal earnings multiplier. The personal earnings multiplier is based on data supplied by the Bureau of Economic Analysis (BEA). The BEA develops income multipliers for each state. Based on this data, it is estimated that for every one dollar earned by direct employees generated by river activity, an additional \$1.017 of personal income and consumption expenditures would be created as a result of re-spending the income for purchases of goods and services produced locally. Hence, a personal earnings multiplier of 2.017 was used to estimate the direct personal income and consumption impact of \$4.34 billion, inclusive of the re-spending effect.

In addition, the 149,534 indirect job holders earned nearly \$6 billion. Therefore, the total personal income impact (direct, indirect and the re-spending and consumption impact) amounted to \$10.3 billion in 2002.

3. PURCHASES BY FIRMS

The firms dependent upon the river system activity make purchases in the local economy for maintenance and repair services, professional services, supplies, communications and fuel and transportation services (excluding surface and barge transportation services already included in the revenue impact). As the result of river system activity in 2002, these firms made \$9.1 billion of purchases from the local and regional economy. The majority of these purchases, as shown in Exhibit III-5, are for raw materials, followed by purchases for utilities. These \$9.1 billion of purchases generated the 149,534 indirect jobs described previously.

⁶The average wage and salary income received by employees in the 10 county area is \$34,390 based on the U.S. Department of Labor, Bureau of Labor Statistics, Occupational Employment Statistics, 2002

Exhibit III-5
 Distribution of \$9.1 Billion of Local
 Purchases
 (Millions of Dollars)

Supplying Industry	Indirect Jobs
Maintenance and Repair	\$457
Support Services	\$335
Utilities	\$716
Goods and Supplies	\$65
Capital Purchases	\$181
Raw Materials	\$5,569
Fuel	\$114
Miscellaneous	<u>\$1,616</u>
Total	\$9,052

4. TAX IMPACTS

State and local tax impacts are based on per capita income tax burdens which are developed at the federal, state, county and municipal levels using data from the Tax Foundation. Using these tax indices, it is estimated that river traffic generated \$1.0 billion of state and local tax revenues in 2002. In addition, the activity supported \$2.2 billion of federal taxes.

IV. TRANSPORTATION BENEFITS

In addition to the jobs, personal wage and salary income, revenue and tax impacts generated by the river system activity within the Port of Pittsburgh Commission District, the river system also provides several transportation system benefits to the regional economy. These benefits include transportation cost savings to local and regional industries provided by barge transportation over alternative surface transportation modes, environmental benefits to the region and local and state highway maintenance costs.

1. TRANSPORTATION COST SAVINGS

The river system serving the Pittsburgh region is a key economic development catalyst for the region in that the barge transportation provides a low cost means of transporting raw materials, intermediate goods and final products. This is particularly key to heavy industries such as the steel industry and the petrochemical industry, as well as power generating plants. These are key industries to the Pittsburgh economy and are characterized by high paying jobs that support additional economic growth through local purchases by both employees as well as the industries.

To estimate the average cost savings for the key commodities moving on the river system for which a surface transportation alternative exists (rail or truck for either the current routing or for a different routing), the next least costly routing by a surface mode was identified from the interviews with each key river system user. In many cases the power plants and coking facilities did not have rail access, and hence if the river system were not available for barge transportation, these facilities would not exist in the Pittsburgh region. Several receivers of coal by barge reported higher transportation costs if trucking were used in lieu of barging. They report trucking costs would at least double or quadruple. A shift from barge to truck on a current 50-mile barge trip would nearly triple freight costs from \$1.75/ton to \$4.75/ton. The freight cost would almost quadruple for West Virginia coal destined for the Pittsburgh area. A \$4.00/ton barge rate would increase to \$14.50/ton by truck. The freight costs of coke now barged to Pittsburgh from the Gulf Coast would experience significant freight increases if diverted to truck or rail. One receiver of metal products barged from New Orleans indicated the cost of trucking would result in freight increasing from \$11.00/ton to \$33.00/ton. Receivers of sand & gravel in the Pittsburgh area stated trucking costs for local product are double the local barge cost and the trucking cost for product delivered from outside the Port of Pittsburgh Commission District are triple the barge cost.

Based on these cost savings, it is unlikely that such industries as petrochemicals, plastics and steel would have located in the Pittsburgh region. Furthermore, if the river transportation were not available to these industries it is likely that such industries would leave the region.

In addition to the direct transportation cost savings to local industries, the use of the river system provides an overall lower transportation cost structure to other Pittsburgh industries even if such industries do not use the river system. For example, because of the availability of barge

transportation to move steel products into and from the region by barge, the competing truck rates for steel products will also be held to competitive levels.

2. ENVIRONMENTAL BENEFITS OF BARGE TRANSPORTATION

Barge transportation provides significant benefits over surface transportation modes in terms of air quality, in addition to cost efficiencies. Statistics from the Environmental Protection Agency, Emission Control Lab identify the amount of emissions released by towboats, trucks and trains per thousand ton-miles. Exhibit IV-1 presents the emission levels of each of the three modes.

Exhibit IV-1
Emissions Produced per Thousand Ton-Miles
(Pounds)

MODE	Hydrocarbon	Carbon Monoxide	Nitrous Oxide	Total
Towboat	0.09	0.2	0.53	0.82
Train	0.46	0.64	1.83	2.93
Truck	0.63	1.9	10.17	12.7

The exhibit shows the total emissions produced by towboats moving one ton of cargo 1,000 miles is 28% of the emissions produced by trains and 6.5% of the emissions produced by trucks. Therefore, as the share of freight traffic moving by barge increases (compared to rail and truck) in the Pittsburgh region, the impact of freight transportation on air quality will be improved.

3. ROADWAY MAINTENANCE COSTS

Based on data provided by the Federal Highway Administration, Pavements Division, it is estimated that the cost of roadway surface repair ranges from \$.05 to \$.20 per truck mile.⁷ Since the river system provides an alternative to truck transportation in the Pittsburgh region, roadway repair costs are likely to be less than would be the case if river transportation were not available.

The importance of barge transportation for coal on highway costs is underscored by the fact that if 250,000 tons of coal now moved by barge to a coking facility were to shift to truck, about 11,400 trucks would be required to handle this coal, annually. Assuming a 100 mile haul with no backhaul, this diversion to truck from barge would cost about \$285,000 annually in highway surface repair costs. This does not include the cost of congestion in the local community that would be generated by 11,400 trucks per year, which translates into 64 truck trips per day, 365 days per year, through a community in which such a coking facility would be located.

⁷ Allocation of 2000 Federal Highway Program Costs, www.fha.dot.gov/policy/hcas/addendum.htm

V. COMPARISONS WITH 1998 IMPACTS

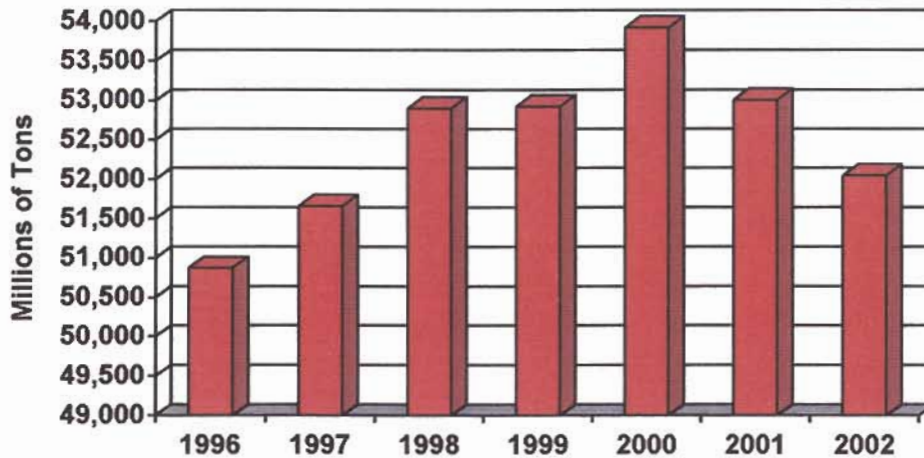
The purpose of this chapter is to provide a comparison of the 2002 economic impacts generated by the river activity within the Port of Pittsburgh Commission District with the impacts generated by river activity within the District in 1998. The methodology used by Martin Associates to measure the direct economic impacts generated by the river activity in the current study (2002) is, for the most part, identical to the methodology used to measure the direct impacts generated by the Port of Pittsburgh in 1998. There are several structural changes to the analysis. First, the induced model has been updated to reflect new consumption behavior of Pittsburgh area residents. Secondly, the jobs to sales ratios for industries providing induced and indirect jobs have been updated and the more recent jobs to sales ratios reflect the growth in labor productivity over time. The regional economy has experienced a decline since 1998. For example, there has been a 6 percent decline in the steel products/fabrication industry in the Pittsburgh region since 1998, and further a decline in jobs with the primary steel industry. In general, during the 1998-2002 period, jobs in local manufacturing fell by 2.7 percent. In the current study, jobs with industries located in waterfront industrial parks that are not dependent upon river transportation or use the water from the river, are included as related jobs. In the earlier study, jobs with industrial parks are included as direct jobs. Finally, in the 2002 study the indirect jobs resulting from the purchases of raw materials are estimated. In the earlier studies these indirect jobs with suppliers of raw materials were not included.

The first section of this chapter compares tonnage activity at the river terminals within the Port of Pittsburgh Commission District. Section 2 compares total impacts.

1. COMPARISON OF TONNAGE ACTIVITY

Exhibit V-1 shows that total tonnage moving in the Port District peaked in 2000. This reflects changing national economic conditions as well as the contraction of the manufacturing sector, and in particular the steel industry in the Pittsburgh region. Tonnage moving via terminals in the Port of Pittsburgh Commission District fell by nearly 900,000 tons over the period, from 52.9 million tons in 1998 to 52.1 million tons in 2002.

Exhibit V-1
Historical Tonnage Moving via the Port of Pittsburgh
(Short Tons)



2. COMPARISON OF TOTAL IMPACTS

Exhibit V-2 shows the total port-wide impacts generated by maritime activity at the river terminals and marinas within the Port of Pittsburgh Commission District in 1998 and 2002.

As this table indicates, the number of direct jobs with surface transportation and the river system services sector fell by 3,528 jobs. The major factor contributing to the change in these direct jobs is due to the closing of a major employer on the river system. The largest job loss was on the Monongahela River, and this reflects the shutdown of LTV operations on the Monongahela River. This shutdown impacted direct jobs both with shippers/consignees as well as terminal operator jobs associated with coal shipments and receipts as well as steel movements on that river system. In addition, in 2002 the jobs with industrial parks not dependent upon the river system for either transportation or other uses were counted as related jobs. In 1998, 800 jobs with industrial parks were counted as direct jobs. In 2002, jobs with industrial parks grew to nearly 6,000 jobs, and these are counted as related jobs.

Exhibit V-2
Comparison of Impacts

<u>IMPACT CATEGORY</u>	<u>2002</u>	<u>1998</u>	<u>CHANGE</u>
JOBS			
Direct Port Sector*	14,887	18,415	(3,528)
Direct Shipper/Consignee	30,192	34,509	(4,317)
Indirect	149,534	89,406	60,128
<u>Induced</u>	<u>23,264</u>	<u>35,332</u>	<u>(12,068)</u>
Total	217,877	177,662	40,215
INCOME (\$1,000)			
Direct	\$2,152,433	\$2,114,520	\$37,913
Re-spending	\$2,188,594	\$2,051,084	\$137,510
<u>Indirect</u>	<u>\$5,979,355</u>	<u>\$2,166,490</u>	<u>\$3,812,865</u>
Total	\$10,320,382	\$6,332,094	\$3,988,288
LOCAL PURCHASES (\$1,000)	\$9,052,381	\$6,758,102	\$2,294,279
BUSINESS REVENUE (\$1,000) (Excludes value of products and production)	\$873,151	\$624,842	\$248,309
STATE & LOCAL TAXES (\$1,000)	\$1,021,718	\$696,299	\$325,419

* Industrial park jobs were included with shippers/consignees in 1998 and are counted as related in 2002

Induced jobs also fell despite the increase in personal direct income and the re-spending impact. This loss reflects the increased productivity in the supplying/support industries (resulting in a lower number of induced jobs per dollar of local purchases). For example, retail productivity increased 17 percent since 1997, while wholesale productivity gains of 14 percent were recorded. For general merchandise stores, productivity gains in excess of 60 percent were recorded. As a result, less induced jobs are generated per dollar of local purchases.

Direct personal income grew by \$37.9 million over 1998 levels, but when controlling for inflation since 1998, the personal income actually fell in constant dollars by about 8 percent, reflecting the decline in direct jobs. The re-spending and consumption impact grew by \$137.5 million, reflecting a larger multiplier impact in 2002 vs. 1998. The growth in the income multiplier as developed by the Bureau of Labor Statistics reflects the fact that a smaller portion of local purchases are leaking out of the Commonwealth of Pennsylvania in 2002 than was the case in 1998. As a result, the respending impact increased at a greater rate than direct personal income.

Business revenue grew by nearly \$250 million, a 26 percent increase in constant dollars, reflecting a growth in truck and rail rates over time.

Local purchases by the dependent users (shippers/consignees) increased by \$2.3 billion, resulting in a growth of 60,128 indirect jobs. This growth in indirect purchases reflects the inclusion of the purchases of raw materials consumed by the dependent users (shippers/consignees). These purchases were not included in the 1998 study.

Finally, state and local taxes increased by \$325.4 million, a 32 percent increase in constant dollars.

As this analysis indicates the economic impact of the river terminals within the Port of Pittsburgh Commission District continues to grow, particularly in terms of the impacts of the river system on indirect jobs within the Commonwealth of Pennsylvania. For every direct job created by river activity within the Port of Pittsburgh Commission District, 4.8 total jobs are supported throughout the Commonwealth of Pennsylvania. Therefore, the industry supported directly by the river activity within the Port District has a very strong multiplier impact throughout the Commonwealth. In order to continue to capitalize on this economic engine for the region, as well as for the Commonwealth, it is critical that the lock system and supporting infrastructure on the river system be maintained to high quality standards and operated efficiently in order to accommodate current and future waterborne trade.