

# THE ECONOMIC IMPACTS OF PORT OF CORPUS CHRISTI, 2015



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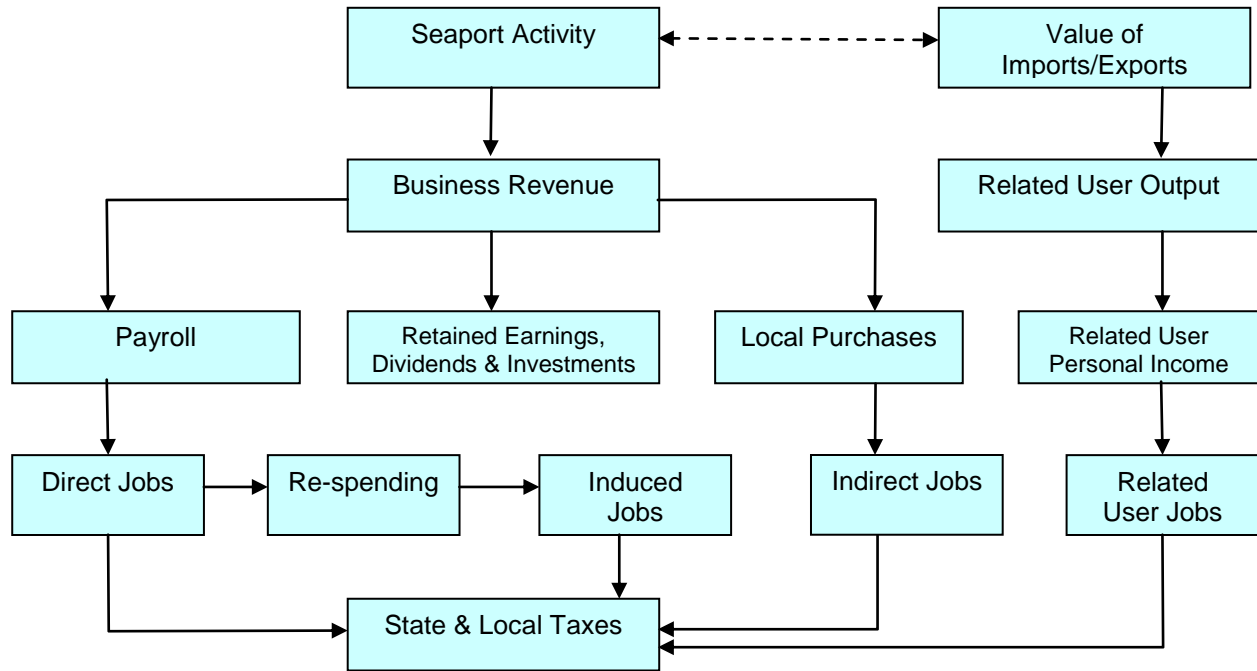
## EXECUTIVE SUMMARY

As part of the economic analysis of the State of Texas Port and Maritime Transportation System conducted by Martin Associates, a separate report was prepared for the Port of Corpus Christi to summarize the economic impacts generated by marine cargo activity at the public and private marine terminals located within the Port District. The public marine terminals are those owned by the Port of Corpus Christi Authority and include the Corpus Christi Public Elevator, the Public Bulk Terminal Docks 1 and 2, the Public Oil Docks, and the Public General Cargo Docks. Also included are private marine terminals such as those associated with chemical plants and refineries located at the Port of Corpus Christi.

The impacts are measured for the year 2015 and an economic impact model has been developed to measure the impacts generated by marine cargo and vessel and barge activity at the public and private marine terminals. The economic impact model can be used to estimate annual updates, as well as to test the sensitivity of the impacts to changes in such factors as marine cargo tonnage levels, labor productivity and work rules, new marine facilities development and expansion, the impacts of harbor and channel deepening and widening, and the impacts of bridge height restrictions. The model can also be used to compare the economic impacts of marine activity with non-maritime development of waterfront land.

Exhibit E-1 graphically demonstrates how seaport activity impacts the local and regional economies. As this exhibit indicates, the marine cargo and vessel activity initially generate business revenue to the firms supplying marine services. This revenue is used to purchase employment (direct jobs) to provide the services, to pay stockholders and for retained earnings, and to purchase goods and services from local firms, as well as national and international firms (creating indirect jobs with these firms). Businesses also pay taxes from the business revenue.

Exhibit E-1  
Flows of Economic Impacts through the Economy



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. Finally, taxes are paid by individuals employed with the firms providing the services to the marine terminals.

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

- Jobs
- Employee earnings
- Business revenue
- Local Purchases by Firms
- 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 seaport. These jobs are dependent upon this activity and would suffer immediate dislocation if the seaport activity were to cease. Seaport direct jobs include jobs with railroads and trucking companies moving cargo to and from the Port of Corpus Christi's public and private marine terminals, members of the International Longshoremen's Association (ILA) and non-ILA dockworkers, steamship agents, freight forwarders, ship chandlers, warehouse operators, bankers, lawyers, terminal operators, stevedores, etc.
- Induced jobs are jobs created locally and throughout the regional economy due to purchases of goods and services by those directly employed. These jobs are with grocery stores, the local construction industry, retail stores, health care providers, local transportation services, etc., and would also be discontinued if seaport activity were to cease.
- Indirect jobs are those jobs generated in the local economy as the result of local purchases by the firms directly dependant upon seaport activity. These jobs include jobs in local office supply firms, equipment and parts suppliers, maintenance and repair services, etc.
- Related jobs are with Texas shippers and consignees related to steel products received at the terminals, as well as the jobs related to the petroleum products and alumina moving via the Port. Related jobs are not dependent upon the seaport marine terminals to the same extent as are the direct, induced and indirect jobs. For example, these firms can and do use other ports. It is the demand for the final product which creates the demand for the employment with these shippers/consignees, not the use of a particular seaport or marine terminal.

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 marine activity. State and local taxes include taxes paid by individuals, as well as firms dependent upon the seaport activity.

The study is based on interviews with firms providing services to the cargo and vessels handled at the Port of Corpus Christi's public and private marine terminals within the Port of Corpus Christi. These interviews are included in the statewide economic impact analysis in which the data collection consisted of interviews with 2,106 firms providing maritime services in the State of Texas. In many cases, especially with lines and agents, miscellaneous maritime services, tug and barge companies, and maritime construction firms, these firms were providing maritime services at more than one port in the analysis. In this situation in which one firm provides services at multiple ports, care was taken to allocate the level of activity to the Port of Corpus Christi's marine terminals. The economic impacts captured from these interviews related to the maritime operations at the Port of Corpus Christi's public and private marine terminals were included in this analysis for the Port of Corpus Christi. These firms

represent more than 98 percent of the firms in the Port of Corpus Christi seaport community, underscoring the defensibility of the study. Furthermore, the impacts can be traced back to the individual firm. The data collected from the interviews were then used to develop an operational model of the Port of Corpus Christi public and private marine terminals.

***SUMMARY OF IMPACTS GENERATED BY THE PORT OF CORPUS CHRISTI***

The economic impacts generated by the public and private marine terminals are summarized in Exhibit E-2.

Exhibit E-2  
Summary of the Local and Regional Economic Impacts Generated by  
the Port of Corpus Christi

<b>PORT OF CORPUS CHRISTI</b>	
<b>JOBS</b>	
Direct	13,770
Induced	14,456
Indirect	16,212
Related Users	<u>31,938</u>
<b>TOTAL JOBS</b>	<b>76,377</b>
<b>PERSONAL INCOME (\$ Millions)</b>	
Direct	\$662.18
Re-Spending/Local Consumption	\$1,753.72
Indirect	\$787.37
Related User Income	<u>\$1,508.84</u>
<b>TOTAL PERSONAL INCOME</b>	<b>\$4,712.10</b>
<b>REVENUE/ECONOMIC OUTPUT (\$ Millions)</b>	
Direct Business Revenue	\$1,739.85
Local Purchases	\$1,555.48
Related Users Output	<u>\$11,738.71</u>
<b>TOTAL REVENUE</b>	<b>\$15,034.04</b>
<b>STATE AND LOCAL TAXES (\$ Millions)</b>	
Direct	\$49.66
Re-Spending/Local Consumption	\$131.53
Indirect	\$59.05
Related User Taxes	<u>\$113.16</u>
<b>TOTAL TAXES</b>	<b>\$353.41</b>

Totals may not add due to rounding

Specifically, the marine cargo facilities at the Port of Corpus Christi generated the following impacts in the State of Texas in 2015:

- **76,377 jobs in Texas** are in some way related to the cargo moving via the public and private marine terminals at the Port of Corpus Christi.
- Of the 76,377 jobs, **13,770 direct jobs** are generated by the marine cargo and vessel activity at the Port of Corpus Christi.
- As the result of local and regional purchases by those 13,770 individuals holding the direct jobs, an additional **14,456 induced jobs** are supported in the regional economy.
- **16,212 indirect jobs** were supported by \$1.6 billion of local purchases by businesses supplying services at the marine terminals and by businesses dependent upon the Port of Corpus Christi for the shipment and receipt of cargo.

*In 2015, marine cargo activity at the public and private terminals generated a total of \$15.2 billion of total economic activity in the State of Texas.*

- Of the \$15.2 billion, \$1.7 billion is the direct business revenue received by the firms directly dependent upon the Port and providing maritime services and inland transportation services to the cargo handled at the public and private marine terminals. An additional \$11.7 billion represents the value of the output to the State of Texas that is created due to the cargo moving via the Port of Corpus Christi. This includes the value added at each stage of producing an export cargo, as well as the value added at each stage of production for the firms using imported raw materials and intermediate products that flow via the marine terminals and are consumed within the State. In addition, \$1.8 billion of the re-spending of personal income and local consumption purchases are supported in the Texas economy. These components are additive and represent independent monetary impacts supported by the cargo and vessel activity. Other dollar value impact measures are not included in the total economic value since they are interdependent. Direct income is not included since it is part of the direct business impact and similarly, local purchases by the firms are from the direct business revenue generated by port activity, and also used to pay indirect income. Finally, taxes are paid by the individuals from the direct, induced, indirect and related income and the direct business revenue and the related output.
- **\$662.2 million of direct wages and salaries** were received by those 13,770 directly employed, representing an average salary of nearly \$48,089. As the result of re-spending

this income, an additional \$1.8 billion of income and consumption expenditures were created. The 16,212 indirect job holders in Texas received \$787.4 million of indirect wages and salaries. In total, about **\$4.7 billion of direct, induced and indirect personal wages and salaries** were generated by maritime activity at the public and private terminals located in the Port of Corpus Christi.

- **\$353.4 million of state and local taxes** were generated by activity at the marine terminals, including \$240.2 million of direct, induced and indirect state and local taxes and \$113.2 million of related state and local tax impacts.
- **31,938 Texas jobs with shippers/consignees** using the marine facilities to move steel, machinery, alumina and liquid and dry bulk cargoes are classified as related to the port's public and private marine terminals. These jobs are classified as related, not directly dependent upon the marine terminals, because the employment with these shippers/consignees is driven by the demand for the product, not by the use of the Port's public and private marine facilities.



## I. OVERVIEW OF THE ANALYSIS AND SUMMARY OF METHODOLOGY

As part of the economic analysis of the State of Texas Port and Maritime Transportation System conducted by Martin Associates, a separate report was prepared for the Port of Corpus Christi to summarize the economic impacts generated by marine cargo activity at the public and private marine terminals located within the Port District. The Port of Corpus Christi Authority's marine terminals include the Public Grain Elevator, the Public Oil Docks, the Bulk Terminal Docks, and the Public General Cargo Docks, as well as the private terminals such as the petroleum refineries and petrochemical plants. The impacts are estimated in terms of jobs, personal earnings, business revenue, and state and local taxes. The impacts are estimated for marine cargo and vessel activity in 2015. An economic impact model has also been developed, which can be used in evaluating the sensitivity of impacts to changes in tonnage, labor productivity, labor work rules, commodity mix, inland origins/destinations of commodities and vessel size.

The methodology used in this analysis has been developed by Martin Associates and has been used to estimate the economic impacts of seaport activity at public and private marine terminals of more than 300 United States and Canadian ports. Martin Associates previously conducted an economic impact study for the Port of Corpus Christi in 2012, 2009, 2003 and 1994.

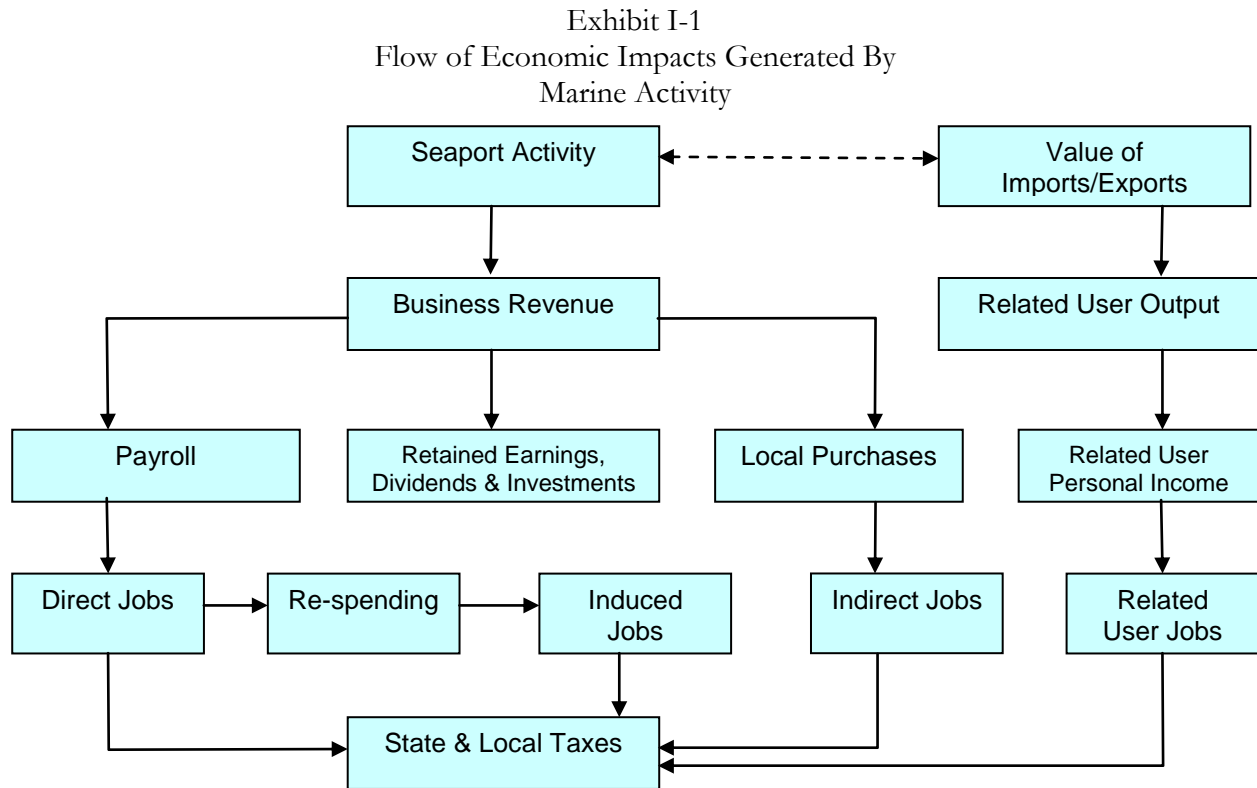
The remainder of this chapter presents an overview of the economic impact analysis and consists of the following sections:

- Flow of economic impacts through the local and regional economies
- The structure of the impact analysis
- Summary of the methodology
- Commodities included in the analysis.

### 1. FLOW OF IMPACTS

Waterborne activity at a seaport contributes to the local and regional economy by generating business revenue to local and national firms providing vessel and cargo handling services at the marine terminals. These firms, in turn, provide employment and income to individuals, and pay taxes to state and local governments. Exhibit I-1, on the following page, shows how activity at marine terminals generate impacts throughout the local, state and national economies. As this exhibit indicates, the impact of a seaport on a local, state or national economy cannot be reduced to a single number, but instead, the seaport activity creates several impacts. These are the revenue impact, employment impact, personal income impact, and tax impact. These impacts are non-additive. For example, the income impact is a part of the revenue impact, and adding these impacts together would result in double

counting. Exhibit I-1 shows graphically how activity at the Port of Corpus Christi's public and private marine terminals generate the four impacts.



### 1.1 Business Revenue Impact

At the outset, activity at the port generates business revenue for firms which provide services. 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 stockholders, 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 seaport, in contributions to state and local taxes, in lease payments to the Port of Corpus Christi Authority by tenants, and wharfage and dockage fees paid to the Port of Corpus Christi Authority.

## 1.2 Employment Impact

The employment impact of seaport activity consists of four levels of job impacts.

- Direct employment impact - jobs directly generated by seaport activity. Direct jobs generated by marine cargo include jobs with railroads and trucking companies moving cargo between inland origins and destinations and the marine terminals, longshoremen and dockworkers, steamship agents, freight forwarders, stevedores, 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 activity at the Port of Corpus Christi marine terminals or private terminals were to be discontinued.
- Induced employment impact - jobs created throughout the local economy because individuals directly employed due to seaport 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 - 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 companies interviewed as part of this study, and include jobs with local office supply firms, maintenance and repair firms, parts and equipment suppliers, etc. It is to be emphasized that special care was taken to avoid double counting, since the current study counts certain jobs as direct (i.e., trucking jobs, jobs with railroads, jobs with insurance companies and admiralty law firms, etc.) which are often classified as indirect by other approaches, notably the input/output model approach.
- Related user employment impact - jobs with firms using the seaport to ship and receive cargo. While the facilities and services provided at the Port of Corpus Christi's marine terminals are a crucial part of the infrastructure allowing these jobs to exist, they would not necessarily be immediately displaced if marine activity were to cease.

## 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 seaport activity. 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 Corpus Christi 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). The direct earnings are a measure of the local impact since they are received by those directly employed by seaport activity.

#### 1.4 Tax Impact

Tax impacts are tax payments to the state and local governments by firms and by individuals whose jobs are directly dependent upon and supported (induced jobs) by activity at the marine terminals.

## 2. IMPACT STRUCTURE

The four types of economic impacts are created throughout various business sectors of the state and local economies. Specifically, four distinct economic sectors are impacted as a result of activity at the marine terminals. These are the:

- Surface Transportation Sector
- Maritime Services Sector
- Shippers/Consignees using the Port
- Port of Corpus Christi Authority

Within each sector, various participants are involved. Separate impacts are estimated for each of the participants. A discussion of each of the four 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 cargoes between the marine terminals and the inland origins and destinations. Pipeline transportation is also included in this sector.

### 2.2 The Maritime Services Sector

This sector consists of numerous firms and participants performing functions related to the following maritime services:

- Cargo Marine Transportation

- Vessel Operations
- Cargo Handling
- Federal, State and Local Government Agencies

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

- Cargo Marine Transportation - Participants in this category are involved in arranging for inland and water transportation for export or import freight. The freight forwarder/customshouse broker is the major participant in this category. The freight forwarder/ customshouse broker arranges for the freight to be delivered between the terminals and inland destinations, as well as the ocean transportation. This function performed by freight forwarders and customshouse brokers is most prevalent for general cargo commodities.
- Vessel Operations - This category consists of several participants. The steamship agents provide a number of services for the vessel as soon as it enters the port; the agents arrange for pilot services and towing, for medical and dental care of the crew, and for ship supplies. The agents are also responsible for vessel documentation. In addition to the steamship agents arranging for vessel services, those providing the services include:
  - Chandlers - supply the vessels with ship supplies (food, clothing, nautical equipment, etc.)
  - Towing firms - provide the tug service to guide the vessel to and from port
  - Pilots - assist in navigating the vessels along the Inner Harbor to and from the Port of Corpus Christi marine terminals and private marine terminals
  - Bunkering firms - provide fuel to the vessels
  - Marine surveyors - inspect the vessels and the cargo
  - Shipyards/marine construction firms - provide repairs, emergency or scheduled, as well as marine pier construction and dredging.
- Cargo Handling - This category involves the physical handling of the cargo at the terminals between the land and the vessel. Included in this category are the following participants:

- Longshoremen - include members of the International Longshoremen's Association (ILA), as well as non-ILA dockworkers that are involved in the loading and unloading of cargo from the vessels, as well as handling the cargo prior to loading and after unloading.
- Stevedoring firms - manage the longshoremen and cargo-handling activities. Stevedoring services at the Port of Corpus Christi Authority terminals are provided by private stevedoring companies.
- Terminal operators - are often stevedoring firms who operate the maritime terminals where cargo is loaded and off-loaded.
- Warehouse operators - store cargo after discharge or prior to loading and consolidate cargo units into shipment lots.
- Government Agencies - This service sector involves federal, state and local government agencies that perform services related to cargo handling and vessel operations at the Port. U.S. Customs, Bureau of Immigration, U.S. Department of Labor, U.S. Department of Agriculture, U.S. Coast Guard, the Army Corps of Engineers, and U.S. Department of Commerce employees are involved. These services are provided by the government offices located in the Corpus Christi area.

### 2.3 Shippers/Consignees

Two categories of shippers and consignees are considered in the analysis: those that are totally dependent on the public and privately-owned marine terminals and those located throughout the regional economy whose business is only related to the Port. Those in the first category would most likely shut down operations if the marine terminals were not available for their use, while those in the second category would ship or receive materials via another port. Related jobs consist of jobs with steel fabrication firms, users and producers of machinery, producers of project cargo, and farmers producing the grain for export. Dependent shippers/consignees include employees of the oil refineries and petrochemical plants that are dependent upon the receipt of crude and chemicals by vessel/barge and the shipment of refined product by vessel/barge, as well as plants within the Port of Corpus Christi that are dependent upon the receipt or shipment of machinery, construction materials and other miscellaneous breakbulk and bulk cargoes. For this current study, the majority of shippers and consignees are with petro-chemical plants and petroleum refineries.

Because of this difference, employment, income and tax impacts are estimated only for dependent shippers/consignees. Employment with related shippers and consignees is considered port-related, and not port-generated. For this group, no income and tax impacts are estimated.

## 2.4 Port of Corpus Christi Authority

The Port of Corpus Christi Authority sector includes those individuals employed whose purpose is to oversee port activity at the Port of Corpus Christi-owned marine terminals.

## 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 vessel and cargo activity at the public and private terminals at the Port of Corpus Christi.

### 3.1 Data Collection

The cornerstone of this report is the collection of detailed baseline impact data from firms providing services at the Port of Corpus Christi marine terminals and the private terminals. To ensure accuracy and defensibility, the baseline impact data were collected from interviews with firms in the Corpus Christi maritime community, as well as additional interviews with firms included in the statewide economic impact analysis of which a total of 2,106 interviews were conducted for the statewide analysis.

In cases in which one firm provides services to multiple ports, care was taken to allocate the level of activity to the Port of Christi's marine terminals. These firms represent the totality of service providers at the Port of Corpus Christi's public and private marine terminals located within the Port of Corpus Christi Port District, as identified by:

- Port of Corpus Christi's internal customer and tenant lists
- The 2012 data base developed by Martin Associates
- The Port of Corpus Christi, Port Directory
- Statewide Economic Impact Analysis Directory

These firms represent more than 98 percent coverage of all firms identified in the seaport community. For the most part, multiple interviews were conducted with several persons in each firm.

### 3.2 Direct Jobs, Income, Revenue, and Tax 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 Port of Corpus Christi's marine terminals, as well as the private terminals.

The direct tax impacts are estimated at a state, county and local level based on state and local per capita tax burdens at each jurisdictional level.

This baseline survey data was also used to develop an operational model which can be used to update the impacts of the Port of Corpus Christi Authority's marine terminals and private terminals on an annual basis and to evaluate the impacts of changes in:

- Marine cargo tonnage, by commodity
- Seaport labor productivity, and work rules
- Modal distribution of seaport cargo (what percent of the inland transportation of a commodity is truck versus rail), as well as the geographical distribution of each commodity
- Vessel calls and vessel size
- New carrier services.

Also, the operational model can be used to evaluate alternative facilities expansion projects and new marine terminal construction, as well as the impacts associated with channel dredging and widening.

### 3.3 Induced Impacts

Induced impacts are those generated by the purchases of the individuals employed as a result of seaport 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 Income Division. This personal earnings multiplier is used to estimate the total personal earnings generated in the region as a result of the activity at the Port of Corpus Christi Authority's Marine Terminals and at private marine terminals. A portion of this total personal earnings impact is next allocated to specific local purchases (as determined from consumption data for Corpus Christi residents, as developed from the U.S. Bureau of Labor Statistics, Consumer Expenditure Survey, 2014). 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 cargo and vessel activity at the marine terminals, including the dependent shippers/consignees. These purchases are for goods and services such as office supplies and equipment, maintenance and repair services, 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 firms interviewed. These local purchases were then combined with employment to sales ratios in local supplying industries, developed from the U.S. Bureau of Economic Analysis Regional Input-Output Modeling System for the State of Texas. The indirect job ratios also account for the in-state spin-off effects from multiple rounds of supply chains that are required to provide the locally purchased goods and services.

### 3.5 Related Impacts

Related impacts measure the jobs with shippers and consignees moving cargo through the Port of Corpus Christi's marine terminals and private terminals. These jobs are classified as related jobs, since the firms using the marine terminals for the movement of cargo can and do use other seaports and marine terminals. For example, firms importing or exporting containerized cargo typically select a steamship line rather than the seaport through which the cargo will move, and the port through which the containerized cargo moves is ultimately determined by the steamship line's port call rotation. Similarly, exporters of breakbulk cargo often use freight forwarders, who in turn choose the port of export. Importers of breakbulk cargo often use several ports for the import of cargo, based on market locations. Because of the proximity of other ports and the associated steamship service at these ports, such as Galveston, Houston, New Orleans, as well as West Coast Ports (competing for the Far East land bridge cargo) to the Port of Corpus Christi's marine terminals, importers as well as exporters of containers and breakbulk cargo have some flexibility in port choice. As a result, jobs with these exporters and importers cannot be counted as dependent upon the public and private marine terminals.

These jobs are estimated based on the value per ton of the commodities exported and imported via the Port and the associated jobs to value of output ratios for the respective producing and consuming industries located in the state. The value per ton of each of the key commodities moving via the Port of Corpus Christi was developed from the U.S. Maritime Administration, Foreign Trade Statistics. Ratios of jobs to value of output for the corresponding consuming and producing industries were developed by Martin Associates from the U.S. Bureau of Economic Analysis, Regional Input-Output Modeling System for the State of Texas. These jobs to value coefficients include the in-state, spin-off impacts that would occur in order to produce the export commodity or use the import commodity in production. The percent of each commodity that is produced or consumed in the State of Texas was next developed from the interviews with the terminal operators, and the value of each commodity remaining in the State of Texas was calculated. The ratios of jobs to value of export or

import cargo were then combined with the in-state value of the respective commodities moving via the marine terminals to estimate related jobs and the spin-off jobs in-state to support the export and import industries.

#### 4. COMMODITIES INCLUDED IN THE ANALYSIS

A major use of an economic impact analysis is to provide a tool for port development planning. As a port grows, available land and other resources for port facilities become scarce, and decisions must be made as to how to develop the land and utilize the resources in the most efficient manner. Various types of facility configurations are associated with different commodities. For example, containers require a large amount of paved, open storage space, while certain types of break bulk cargoes require covered storage. Frozen meat and perishable commodities require temperature controlled warehouses. Some dry bulk cargo requires covered storage and special dust removing equipment, while tank farms are needed to store liquid bulk cargo.

An understanding of the commodity's relative economic value in terms of employment and income to the local community, the cost of providing the facilities, and the relative demand for the different commodities is essential in making future port development plans. Because of this need for understanding relative commodity impacts, economic impacts are estimated for the following commodities handled at the public and private marine terminals.

- Iron and steel products
- Project cargo/Machinery/Wind energy
- Military cargo
- Break Bulk
- Bulk grain
- Alumina
- Bauxite and ore
- Other dry bulk, including petroleum coke
- Refined products
- Chemicals/Liquid fertilizer
- Crude oil/Condensate
- Petroleum products

It should be emphasized that commodity-specific impacts are not estimated for each of the four economic sectors described in the last section. Specific impacts by commodity could not be allocated to individual commodities with any degree of accuracy for marine construction, ship repair, or the state and federal government. In addition, taxes have not been displayed by specific commodity since these tax impacts will reflect the same distribution over commodities as the employment impact.

## II. MARITIME EMPLOYMENT IMPACTS

In this chapter, the employment generated by maritime cargo activity at the public and private marine terminals within the Port of Corpus Christi Port District is estimated. The chapter is organized as follows:

- First, the total employment that is in some way related to the activities at the public and private marine terminals is estimated.
- Second, the subset of total employment that is judged to be totally dependent (i.e., direct jobs) on port activity is analyzed as follows:
  - The direct job impact is estimated in terms of key economic sectors, i.e., surface transportation sector, maritime services sector, etc.
  - The direct job impact is estimated by detailed job category, i.e., trucking, ILA/dockworkers, freight forwarders/customshouse brokers, steamship agents, chandlers, surveyors, etc.
  - The direct job impact is estimated for each of the key commodities/commodity groups.
  - The direct job impact is assessed on a per 1,000 ton basis.
  - The direct job impact is estimated based on the residency of those directly employed.
- Induced and indirect jobs are estimated.
- Finally, jobs related to the marine activity at the public and private marine terminals are described.

### 1. TOTAL MARINE CARGO EMPLOYMENT IMPACT

It is estimated that about 76,377 jobs are directly or indirectly generated by port activities at the public and private marine terminals within the Port of Corpus Christi Port District. Of the 76,377 jobs:

- 13,770 jobs are directly generated by activities at the public and private marine terminals and if such activities should cease, these jobs would be discontinued over the short term.

- 14,456 jobs (induced jobs) are supported by the local purchases of the 13,770 individuals directly generated by port activity at the marine terminals. An additional 16,212 indirect jobs were supported by \$1.6 billion of purchases in the local and regional economy by firms providing direct cargo handling and vessel services, as well as the dependent shippers/consignees (petroleum refineries and petro-chemical plants).
- 31,938 jobs are related to cargo imported and exported via the public and private marine terminals. These jobs are primarily with local companies importing steel and construction equipment that moves through the Port, and farmers producing grain for export. These jobs are considered to be related to activities at the public and private marine terminals, but the degree of dependence on these terminals is difficult to estimate. It is to be emphasized that the level of employment with these exporters and importers is based on the demand for the final product by the use of the marine terminals at Corpus Christi. However, if other terminals were used, it is likely that the costs of importing and exporting would increase, which could have long-term implications on the level of employment with the related shippers/consignees.

## 2. DIRECT MARINE CARGO JOB IMPACTS

In 2015, 103.5 million tons of domestic and foreign waterborne cargo moved via the public and private marine terminals. As a result of this activity, 13,770 full-time jobs were directly created.<sup>1</sup> In this section the jobs are analyzed in terms of:

- Distribution by economic sector
- Distribution by job category
- Distribution by commodity group
- Assessment on a per 1,000 ton basis
- Distribution by county and place of residency.

These distributions are developed in more detail below.

### 2.1 Job Impacts by Sector

Exhibit II-1 presents the distribution of the 13,770 direct jobs among the following economic sectors:

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<sup>1</sup> Jobs are measured in terms of full-time worker equivalents. If a worker is employed only 50 percent of the time by activity at the Port of Corpus Christi public and private marine terminals, then this worker is counted as .5 jobs.

- Surface Transportation sector
- Maritime Service sector
- Shippers/Consignees sector
- Port of Corpus Christi Authority

The exhibit indicates that 4,504 direct jobs are with terminal operators and dependent shippers/consignees, primarily petro-chemical firms and refineries located within the Corpus Christi Port District. Direct jobs with government agencies located in the Port District account for 3,406 jobs, including jobs with the Naval Air Station located in the Port District. In 2015, there were 3,293 direct jobs with the miscellaneous maritime service/marine construction firms. The majority of these maritime service sector jobs are with marine construction firms.

Exhibit II-1  
Employment Impacts by Sector and Job Category

	<b>TOTAL DIRECT JOBS</b>
<b>PORT OF CORPUS CHRISTI</b>	
<b>SURFACE TRANSPORTATION</b>	
Rail	88
Truck	1,348
<b>MARITIME SERVICES</b>	
Terminal	4,504
ILA	43
Tug Assist	55
Pilots	18
Agents	56
Maritime Services/Construction	3,293
Freight Forwarders	61
Warehouse	40
Government	3,406
Barge/Bunkers	404
Chandler/Surveyors	250
<b>PORT OF CORPUS CHRISTI</b>	<u>202</u>
<b>TOTAL</b>	<b>13,770</b>

## 2.2 Direct Job Impacts by Commodity

Most of the 13,770 jobs considered to be generated by port activity can be associated with the handling of specific commodities or commodity groups. Certain employment categories such as government employees and employees with marine construction and ship repair cannot be identified with a specific commodity. As a result, employment in these groups (which totaled 6,952) was not allocated to commodity groups.

Exhibit II-2 presents the relative employment impacts in terms of commodity groups.

Exhibit II-2  
Distribution of Direct Job Impact by Commodity

<b>PORT OF CORPUS CHRISTI</b>	<b>TOTAL DIRECT JOBS</b>
Steel	42
Military	3
Project/Machinery	105
Other Break Bulk	43
Alumina	310
Bulk Grain	279
Bauxite	255
Other Dry Bulk	559
Refined Products	2,969
Crude Oil/Condensate	882
Chem/Fertilizer	1,373
Not Allocated	<u>6,952</u>
<b>TOTAL</b>	<b>13,770</b>

Refined products created the largest number of direct jobs. The majority of these jobs were with petroleum refineries located within the Port of Corpus Christi Port District. The next largest direct job impact was generated by chemical products and liquid fertilizer, and the majority are with private marine terminals associated with the dependent petro-chemical plants.

### 2.3 Job Impacts per Ton

The assessment of the job impacts on a per 1,000 ton basis provides a tool for port planners to use in evaluating the relative importance of different commodities as economic generators. Exhibit II-3 presents the job impacts per 1,000 tons for each commodity moving via the public and private marine terminals.

Exhibit II-3  
Job Impacts per 1,000 Tons

<b>PORT OF CORPUS CHRISTI</b>	<b>DIRECT JOBS/ 1000 TONS</b>
Steel	0.35
Military	1.36
Project/Machinery	0.43
Other Break Bulk	1.01
Alumina	0.26
Bulk Grain	0.08
Bauxite	0.08
Other Dry Bulk	0.15
Refined Products	0.07
Crude Oil/Condensate	0.02
Chem/Fertilizer	0.54

As this exhibit indicates, military cargo and break bulk cargo generates the largest job impacts per 1,000 tons, reflecting the labor intensity of handling and staging the cargo. Despite the fact that refined products generated the largest direct job impact, on a per 1,000 ton basis, refined products generate 0.07 jobs per 1,000 tons. Dry bulk cargo, ores and grain also generate relatively small numbers of jobs per 1,000 tons. The finding that the refined products and bulk cargoes generate relatively small direct jobs per 1,000 tons of throughput reflects the fact that the handling of liquid bulk and dry bulk cargoes is much less labor intensive than handling general cargo and further, the supporting infrastructure of agents, freight forwarders and customhouse brokers, warehousing and terminal operators is greater for general cargo such as machinery, steel, and break bulk cargoes than for the dry and liquid bulk cargoes. If the dependent shippers/consignees were not included in the direct job impacts per 1,000 ton measure, the difference in the labor intensity of general cargo versus liquid bulk cargo would be even more pronounced.

## 2.4 Direct Job Impacts by Place of Residency

To underscore the geographic scope of the impacts generated by the public and private marine terminals, Exhibit II-4 presents the distribution of the 13,770 direct jobs by place of residency. The residency analysis is based on the results of the interviews with the firms dependent on maritime operations at the Port of Corpus Christi’s public and private marine terminals. As this exhibit indicates, 31 percent, of the direct jobs are held by residents of the City of Corpus Christi, about 30 percent held by residents of Nueces County, and 31 percent held by residents of San Patricio County. When the 31 percent of the direct jobs held by residents of Corpus Christi are included with the Nueces County impacts, nearly 61 percent of the 13,770 direct jobs are held by residents of Nueces County.

Exhibit II-4  
Distribution of Direct Jobs by Place of Residency

<b>PORT OF CORPUS CHRISTI</b>		
<b>JURISDICTION</b>	<b>SHARE</b>	<b>TOTAL DIRECT JOBS</b>
Corpus Christi	30.89%	4,253
Aransas	1.42%	196
Bee	0.12%	17
Jim Wells	0.15%	20
Kleberg	2.01%	277
Live Oak	0.26%	36
Nueces	29.77%	4,100
Refugio	0.33%	45
San Patricio	31.30%	4,309
Other Texas	3.38%	465
Other US	<u>0.38%</u>	<u>52</u>
<b>TOTAL</b>	<b>100.00%</b>	<b>13,770</b>

## 3. INDUCED JOBS

The 13,770 directly employed individuals due to activity at the public and private marine terminals received 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, 14,456 jobs in the regional economy were supported. The majority of the induced jobs are in the restaurant sector, followed by the construction and home furnishings sector and with local and regional private sector social services, business services and educational services.



#### 4. INDIRECT JOBS

In addition to the induced jobs generated by the purchases by directly employed individuals, the firms providing the direct services and employing the 13,770 direct jobs make local purchases for goods and services. These local purchases by the firms dependent upon the public and private marine facilities generate additional local jobs -- indirect jobs. Based on interviews with the maritime-dependent firms in the Port of Corpus Christi, these firms made \$1.6 billion of local and in-state purchases in 2015.<sup>2</sup> These direct local purchases created an additional 16,212 indirect jobs in the local economy.

#### 5. RELATED JOBS

It is estimated that about 31,938 jobs are related to cargo moving via the public and private marine terminals. These jobs are with shippers/consignees of refined products, break bulk cargo, steel, machinery and project cargo, as well as with farmers producing grain for export. To estimate these related jobs, Martin Associates developed ratios of jobs to the value of cargo exported/imported (by type of cargo). The jobs per value of shipment data for Texas were developed from the U.S. Bureau of Economic Analysis, RIMS II. The jobs per shipment value were multiplied by value and tonnage of cargo moving via the marine terminals, to estimate the related jobs. The percent of each commodity moving in Texas is based on data supplied for each commodity by the terminal operators and steamship lines interviewed.

It is to be emphasized that these are related jobs, and would not likely disappear if the marine terminals were to close to marine cargo and vessel/barge activity. Given a level of demand for the machinery, steel, export grain and breakbulk commodities (mostly manufactured cargo), the cargo would be shipped through another port such as Galveston, Freeport, Houston or Brownsville.

*It is to be further emphasized that when the impact models are used for planning purposes, related jobs should not be used to judge the economic benefits of a particular project. Related jobs are not estimated with the same degree of defensibility as are the direct, induced and indirect jobs. Therefore, only these three types of job impacts should be used in evaluating port investments. The purpose of the related jobs estimates is to provide a proxy for the magnitude of the more general economic development impact of the private and public port facilities.*

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<sup>2</sup>The \$1.6 billion of in-state purchases includes purchases made by the petro-chemical plants, refineries, and chemical plants directly dependent upon the shipment and receipt of refined products and crude via marine terminals within the Port of Corpus Christi. The purchases by these dependent shippers were included, even though the revenue from the sales of the refined products and the petro-chemicals were not. The demand for the refined and chemical products determines the value of the commodity, not the use of the Port.

### III. MARINE CARGO REVENUE, INCOME AND TAX IMPACTS

The 103.5 million tons of cargo handled at the public and private marine terminals in the Corpus Christi Port District generated revenue for firms in each of the four economic sectors. For example, revenue is received by the railroads and the trucking companies within the surface transportation sector as a result of moving export cargo to the marine terminals and distributing the imported commodities inland after receipt at the marine terminals. The firms in the maritime services sector receive revenue from arranging for transportation services, cargo handling, providing services to vessels in port and repairs to vessels calling the port facilities. The Port of Corpus Christi Authority receives revenue from terminal leases and port charges such as wharfage and dockage assessed on cargo and vessels. In addition, revenue is received by shippers/consignees from the sales of cargo shipped or received via the marine cargo terminals and from the sales of products made with raw materials received through the terminals. Since this chapter is concerned with the revenue generated from providing maritime services, the shipper/consignee revenue (i.e., the value of the cargo shipped or received through the marine terminals, as well as the value of the products produced by the port-dependent shippers/consignees) will be excluded from the remaining discussion.

The revenue generated by port activity 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 dependent upon the maritime activity. The balance of the revenue is distributed in the form of payments to firms located outside the Corpus Christi region providing goods and services to the four sectors and for the distribution of company profits to shareholders.

Since it is difficult to trace all the components of the revenue beneficiaries, an estimate of revenue is developed, but no conclusions are formulated as to how the revenue (other than personal income, taxes and local purchases) is distributed, geographically. It is more accurate to trace the distribution of personal income (which is a subset of revenue) through the geographic locations of individuals receiving the income, as well as the local purchases by port-dependent firms.

## 1. REVENUE IMPACT—TOTAL ECONOMIC ACTIVITY

The revenue impact is a measure of the total economic activity in the State that is generated by the cargo moving via the marine terminals at the Port of Corpus Christi. In 2015, marine cargo activity at the public and private terminals generated a total of \$15.2 billion of total economic activity in the State of Texas. Of the \$15.2 billion, \$1.7 billion is the direct business revenue received by the firms directly dependent upon the Port and providing maritime services and inland transportation services to the cargo handled at the public and private marine terminals. An additional \$11.7 billion represents the value of the output to the State of Texas that is created due to the cargo moving via the Port of Corpus Christi. This includes the value added at each stage of producing an export cargo, as well as the value added at each stage of production for the firms using imported raw materials and intermediate products that flow via the marine terminals and are consumed within the State. In addition, \$1.8 billion of the re-spending of personal income and local consumption purchases are supported in the Texas economy. These components are additive and represent independent monetary impacts supported by the cargo and vessel activity. Other dollar value impact measures are not included in the total economic value since they are interdependent. Direct income is not included since it is part of the direct business impact and similarly, local purchases by the firms are from the direct business revenue generated by port activity, and also used to pay indirect income. Finally, taxes are paid by the individuals from the direct, induced, indirect and related income and the direct business revenue and the related output.

The balance of this section focuses only on the \$1.7 billion revenue impact generated from the provision of transportation services in support of the cargo and vessel activity at the Port of Corpus Christi. It is important to emphasize that the direct business revenue does not include the value of the cargo moving via the marine facilities.

### 1.1 Revenue Impacts by Economic Sector

Exhibit III-1 presents the total revenue estimated to have been generated by port activity in 2015. This revenue includes the revenue received by firms providing services to the commodity and vessel activity at the public and private terminals, and includes revenue received by trucking firms, stevedores, the Port of Corpus Christi Authority, chandlers, agents, pilots, towing companies, etc. Not included is the revenue from the use/value of the cargo moving via the marine terminals.

The majority of the direct business revenue impact is generated with miscellaneous maritime service firms and those providing ship repair and marine construction. Terminal operators and the dependent shippers/consignees, most notably the refined products and petrochemical firms received the next largest revenue impact.

Exhibit III-1  
 Total Revenue Generated By  
 Port Activity

<b>PORT OF CORPUS CHRISTI</b>	<b>REVENUE (\$1,000)</b>
<b>SURFACE TRANSPORTATION</b>	
Rail	\$101,918
Truck	\$174,497
Pipeline	\$50,892
<b>MARITIME SERVICES</b>	
Terminal	\$398,921
Tug Assist	\$22,883
Pilots	\$16,439
Agents	\$5,700
Maritime Services/Construction	\$797,979
Freight Forwarders	\$12,261
Warehouse	\$9,866
Barge/Bunkers	\$8,256
Chandler/Surveyors	\$46,820
<b>PORT OF CORPUS CHRISTI</b>	<b><u>\$93,422</u></b>
<b>TOTAL</b>	<b><u>\$1,739,855</u></b>

Totals may not add due to rounding

## 1.2 Revenue Impacts by Commodity

Exhibit III-2 shows the total revenue impact by commodity and the revenue per ton. It is to be emphasized that the revenue received by shippers/consignees from the sales of the products (value of the commodities) moving via the marine terminals is not included, since product value is determined by the demand for the product, not the use of the marine terminals. The exhibit shows that:

- In terms of total revenue, crude oil/condensate generates the greatest revenue impact followed by refined products and bulk grain. The majority of the revenue generated by crude oil/condensate and the refined products is from the pipeline transportation between the refineries and the end users, as well as from the dependent users and the value added in the production process.
- In terms of per ton revenue, project cargo/machinery and other break bulk cargoes generate the largest revenue impact per ton, reflecting the labor intensity and resulting

terminal charges of moving one ton of project cargo/break bulk across the terminal. Military cargo and steel products generate the next largest revenue impact per ton.

Exhibit III-2  
Revenue Impacts by Commodity

<b>PORT OF CORPUS CHRISTI</b>	<b>REVENUE (\$1,000)</b>
Steel	\$6,900
Military	\$152
Project/Machinery	\$34,691
Other Break Bulk	\$4,546
Alumina	\$3,088
Bulk Grain	\$101,208
Bauxite	\$8,050
Other Dry Bulk	\$80,009
Refined Products	\$205,949
Crude Oil/Condensate	\$325,643
Chem/Fertilizer	\$62,959
Not Allocated	<u>\$906,661</u>
<b>TOTAL</b>	<b>\$1,739,855</b>

The revenue does not include an allocation of the marine construction and ship repair revenue, and Port of Corpus Christi Authority revenue to the commodity groups.

## 2. PERSONAL EARNINGS IMPACT

In the previous section of this chapter, the total revenue generated by port activity was identified. As described earlier, the personal income received by those directly dependent upon port activity along within the Port of Corpus Christi Port District is paid from the business revenue received by the firms supplying direct services at the marine terminals.

The income impact is estimated by multiplying the average annual earnings (excluding benefits) of each port participant, i.e., truckers, steamship agents, pilots, towing firm employees, longshoremen, warehousemen 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 \$662.2 million in personal wage and salary earnings. It is important to emphasize that the average annual earnings of a port-dependent job is about \$48,089. These relatively high paying jobs will have a much greater economic impact in the local economy through stimulating induced jobs than will a job paying lower wages.

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), Regional Input-Output Modeling System (RIMS II). The BEA estimates that for every one dollar earned by direct employees generated by activity at the marine terminals, an additional \$2.65 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 3.65 was used to estimate the induced income and consumption impact of \$1.8 billion. This additional re-spending of the direct income generates the 14,456 induced job impact, described in the previous chapter.

The 16,212 indirect job holders earned \$787.4 million in indirect wages and salaries. Combining the direct, induced and indirect personal income impacts, the total income and local consumption impact is \$3.2 billion. When the \$1.5 billion of related personal income is included, the total personal income impact is estimated at \$4.7 billion.

### 3. TAX IMPACTS

State and local tax impacts are based on per employee tax burdens which are developed at the county, local and state jurisdictional levels. These tax per employee burdens are essentially tax indices that are used to allocate total taxes at each level of government to economic activity generated by the marine terminals. To estimate the per employee tax indices, total taxes received at each governmental level in Texas were developed from the Tax Foundation, which reports total state and local taxes from all sources as a percent of total personal income.

Activity at the public and private marine terminals generated \$240.2 million of state, county and local taxes. When the \$113.2 million of state and local taxes generated by the related users are added, the total state and local tax impacts are estimated at \$353.4 million.