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Re: Feasibility Study for Veracruz Port Expansion Project

As per your previous conversations with Larry Boorstein, enclosed are three (3) copies of the Feasibility Study for the Veracruz Port Expansion Project Final Report for your review. Thank you for your patience and please don't hesitate to contact Larry Boorstein (larry.boorstein@dmjmharris.com) with any comments or questions you may have.

Yours Sincerely,

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VERACRUZ

1 Introduction

1.1 Overview of Study

DMJM Harris, Inc. was engaged by Administración Portuaria Integral de Veracruz, S.A. de C.V. (Apiver) to perform a feasibility study for expansion project for the Port of Veracruz. The U.S. Trade and Development Agency (USTDA) provided a grant to fund performance of the study. DMJM Harris is carrying out the study with subcontractors, Consultores Internacionales, S.C., Grupo Servicios, Ingeniería y Proyectos, S.A. de C.V. (Seinpro), Michael L. Sclar Associates, Inc., Sullivan Consulting Group and EDC, Inc. This study provides an assessment of the feasibility for the expansion project for the Port of Veracruz, covering existing facilities and several alternative expansion sites. The study encompasses demand forecasts and an evaluation of alternatives to provide additional depths and berthing capacity at the existing port and alternative expansion sites for containerships and bulk carriers, and additional dry and liquid bulk storage and container yards and road and rail intermodal access.

The feasibility study components include the following principal tasks:

1. **Review of the Master Plan of Veracruz and Other Studies:** Review of the Master Plan prepared previously by others, plans for development and other available data.
2. **Review Past and Current Activities:** Review of cargo movements and ship traffic statistics, patterns and trends.
3. **Prepare Inventory of Current Facilities:** Review wharf lengths, depths alongside, storage areas, road and rail access and evaluate capacity of existing terminals.
4. **Prepare Cargo and Ship Traffic Forecast:** Review previous forecasts and revise and update cargo and ship traffic forecasts.
5. **Identify Infrastructure, Facilities and Equipment Requirements:** Evaluate facility requirements based on updated cargo and ship traffic forecasts and identify potential U.S. vendors.
6. **Review and Prepare Site Location and Land Use Plan:** Review alternative sites and evaluate the suitability of the Bahía de Vergara site.
7. ***Environmental Aspects:*** *Coordinate with environmental authorities, identify funding agency* requirements and modify environmental assessment included in the previous Master Plan.
8. **Review and Update Master Plan for the Expansion of the Port:** Review and update plans for new terminals, navigation channels, turning basins, capacity utilization and describe the costs for port development.
9. **Review and Provide Financial and Economic Analysis:** Identify capital and operating costs, tariffs and prepare pro format financials to assess the financial feasibility of the expansion projects.
10. **Analyze Alternative Sources of Finance:** Identify financing requirements, alternative sources and documentation.
11. **Prepare Guidelines for Concession Procedures:** Identify concession alternatives for terminal management and development, advantages and disadvantages, recommended alternative and guidelines for concession procedures.
12. **First and Second Interim, Draft and Final Reports.**

The Final Report covers Task 1 to 12 of the study and incorporates revisions based on client comments on the draft Final Report and at the interim and final presentation.

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VERACRUZ

2.0 Issues Affecting Projected Growth In Traffic At Veracruz

2.1 Introduction

A program of research and interviews was undertaken to identify key issues that could affect the volume of cargo using Veracruz positively or negatively from the baseline forecast performed using economic growth and trade figures. These issues would include industry, trade and transportation factors affecting the total volumes expected in the future and the likelihood that these volumes would travel by sea and, in particular, to Veracruz.

Research and interviews focused on four key areas: containers, grains, non-grain bulk and automobiles. Containers are grouped together as they represent an industry in themselves and reflect an aggregation of the shipping preferences of a multitude of import and export industries.

In each case, the results revealed the complexity of the underlying industry, its foreign trade and its *transportation options.* Many competitive considerations are fairly static such as physical proximity to producers or users. In many cases, trade volumes and routings are affected by domestic policies or international trade policies that are out of the hands of the Port, shippers or shipping lines.

2.2 Economic Overview

The growth potential for the Port of Veracruz is primarily dependent on the growth of imports and exports to its area of influence. This area consists of the surrounding region, the Valley of Mexico and surrounding areas for which Veracruz is the closest connection to overseas markets through the Gulf of Mexico and the Atlantic Ocean. Since this area of influence consists of a large portion of the population and economic productivity of Mexico, it follows that the growth of the Mexican economy is key to growth in imports and exports through Veracruz.

Economic growth is generally measured in Gross Domestic Product or GDP. This total production is divided by population to determine per-capita GDP. Economies grow through increasing population and/or increasing per-capita GDP.

Economic Growth Rates 1993-2001

	Mexico	***Veracruz Area of Influence***
Population (2001)	101 M	70M
Population Growth Rate	1.90%	1.85%
GDP Growth Rate	3.05%	2.85%
Per-Capita GDP Growth	1.12%	1.26%

Mexico is growing in both population and per-capita GDP. While the Veracruz area of influence trails the nation overall in population growth, per-capita GDP is growing faster. On the whole, it appears that the economy of the area of influence is growing roughly in line with the Mexican economy as a whole.

Over the period 1993 to 2003, Mexico's manufactured exports grew at an annualized rate of 14.4% while imports grew at the rate of 11.3 percent. Imported agricultural products grew 10% over the same period while industrial materials grew at 26%.

2.3 Containers

Patterns of Container Shipments to Mexico

With regard to containerized cargo, Mexico's Atlantic ports are almost exclusively involved in trade with Europe, South America and the Caribbean. Containerizable trade with the US and Canada is handled predominantly by truck with some competition from intermodal rail. Asian trade is handled principally by Mexico's Pacific ports such as Manzanillo and Lazaro Cardenas. Although there may be long term prospects for some change to this pattern, for the purposes of this study, the current pattern is assumed.

Issues Impacting Projected Growth in Traffic to Veracruz

Several issues have been identified that could impact the accuracy of container traffic projections based on the growth of the Mexican economy and world trade. These are:

- Competitive position of Veracruz versus Altamira and other Mexican ports.
- Competitive position of Veracruz versus Houston, Texas and other US Gulf ports.
- Continuation of trade growth with Europe, South America and the Caribbean.
- Continuation of NAFTA-generated growth in maquila activity.
- Patterns of ship calls and usage.

Interviews were conducted with marketing and operations personnel at some of the shipping lines serving the Gulf. Interviews were also conducted with Mexican shippers who import and export containerized freight through Veracruz. The results of these interviews, along with discussions with terminal operators, Apiver staff and internet research provided the following information.

Results of Research and Interview Effort

Veracruz versus Altamira and Other Mexican Ports

The utility of a port for container services, from the customer standpoint, is largely a function of proximity to the origin or destination of the cargo and the frequency of the shipping services that link the port to the rest of the world. From that standpoint, Veracruz and Altamira stand out from the rest of the Mexican Atlantic ports. Most container services that call one call on the other. Both service a large portion of the Mexican economy and population in close proximity. Although further improvements in Mexican transportation infrastructure or changes in economic development patterns may change the situation, other Atlantic ports stand at such a disadvantage as to be discounted in the near term.

A key point identified in current trade patterns is that the container trade to Veracruz is unbalanced towards imports while Altamira is unbalanced towards exports. Interviews with shippers revealed the following explanations:

All North-American container services are unbalanced on the import side, including Mexico's.

Ship routing can have an influence as imports will tend to leave the ship at the earlier calls on a "string", getting a head start on their land journey instead of staying a further period on sea if the port calls are relatively close together. Likewise, exports would tend to be loaded at the last call before leaving the "string". This seems to be the case regarding Veracruz and Altamira.

Hinterland activity is, by most accounts, the key determinant of competitiveness of Ports. The Veracruz hinterland has fewer export industries than Altamira's. Veracruz' position in closer proximity to the Valley of Mexico encourages import trade bound to that area to enter at that port. Because of this, most of those interviewed believed that Veracruz is dependent totally on its hinterland and does not compete with Altamira for containerized cargo. Another relevant observation with regard to this is that the Mexican transportation network is centered on moving goods to and from ports and entry points with little development of internal communications that would enable distant ports to compete economically for traffic.

I. Veracruz versus Houston and Other US Gulf Ports

As was observed in reviews of data on existing trade patterns, many cargos inbound to Mexico actually land in Houston and continue to Mexican destinations by land. As a much larger port with wider, more frequent service offerings, Houston is considered by some to be a primary competitor to Mexican Atlantic ports for container traffic to and from Mexico. This idea was raised with shippers for their comment.

As a general case, shippers did not see Houston as a direct competitor (contrary to the view of Hutchison and Apiver). The shipper's view was that Houston serviced the Northeast of Mexico including a large amount of maquila activity and the industrial region of Monterrey. For imports to the Valley of Mexico and exports from the non-border regions, Veracruz and Altamira were seen to be preferable routings. A dissenting opinion was that Houston was competitive with Altamira for some cargoes to and from Monterrey due to issues of customs delay at Altamira, which made Houston a more reliable routing.

A significant issue raised by one interviewee was the difficulty of managing the additional cross-border logistics involved in landing in Houston for delivery to Mexico. Others pointed to the particular needs of maquila manufacturers for speed, frequency of service and predictability of schedule being arguments for Houston that don't apply to the same degree for other customers.

There remains the possibility that improved road and intermodal rail services would, in the future, change existing patterns. Interviewees who addressed this felt that Veracruz could take advantage of this as much as anyone else due to the prospect of lower costs for inland movements.

II. Trade Growth in Europe, South America and the Caribbean

Shipping lines tend to concentrate on the present and not to try and predict the future. Consequently, they had little to say on the trade outlook. Some cited their experience that most trade routes to Northern Europe were fairly mature and that they did not expect much growth in that arena.

South America and the Caribbean may become significant sources of trade growth for Mexico if there is continued development of free trade areas. One interviewee noted that trade to these regions is hard to trend as periodic economic and political shocks tend to obscure long term patterns. In the event that regional trade agreements result in increased imports to Mexico, Veracruz would be well poised to take advantage of it.

III. Continuation of NAFTA-Generated Growth in Maquila Activity

Several interviewees felt that maquila growth would start to be affected by Chinese competition and that this was a mature market. Recent economic trends, however, reveal a strong growth in non-maquila export industries in Mexico. Regardless, interviews showed that Veracruz is not currently serving the maquila market to a great extent.

IV. Patterns of Ship Calls and Usage

No one interviewed felt that significantly larger ships would be needed in the trades calling on Veracruz in the near future. They also felt that it was a well-established call on many services and that they did not

expect service patterns in that area to change significantly. However, one interviewee noted that the nature of services to the Gulf of Mexico was that there were long distances involved that made the economic advantages of larger ships very attractive. He felt that improved internal communications links would make services with larger ships and fewer port calls attractive. This view was supported by other industry experts familiar with shipping line decision-making. Although there is not a near-term need to call on Veracruz using larger vessels, developments in the trade-lanes that Veracruz serves may, in the longer term, drive the need for larger vessels. For instance, if Gulf of Mexico – North Europe (including the United States) container trade grows significantly, there may be pressure to use larger vessels and consider dropping calls at ports that cannot accommodate them.

Conclusions

Based on discussions with knowledgeable individuals at terminal operations and shipping lines, the following competitive picture emerges for Veracruz as a container port:

- For imports to the Valley of Mexico, Altamira and Houston do not pose significant competition.
- Changes in the growth pattern of maquila industries are not expected to be significant for Veracruz as it is not a competitor for these cargoes.
- As to the origins/destinations of container services to Veracruz, Europe is a mature market but one that is subject to a free trade agreement. Trade to South America is robust but not yet subject to a free trade agreement and is still subject to periodic economic shocks that distort the normal trade patterns.
- Although the need to accommodate deeper draft vessels did not seem to be an immediate issue for container lines or shippers, it is important to remain competitive in the longer term.
- Improved rail intermodal service from Veracruz would provide an advantage in lowering costs to Valley of Mexico and, in conjunction with larger vessels, could result in competitiveness with Altamira for traffic to its hinterland.
- Vehicular congestion and the interference of the railroad inside the port, as well as traffic outside of the Port were cited as major operational problems by shippers.

2.4 Grains and Oilseeds

Patterns of Consumption / Importation to Mexico

Mexico has seen significant increases in the import of grains for both human and animal consumption since the adoption of NAFTA. Ninety percent of Mexico's total imports of grain and feed products come from the US with a few percentage points more from Canada. This growth is expected to continue for the next ten years. Imports of these products from 2000 to 2009 are projected to grow significantly but at lower levels than experienced in the 1990 to 1999 period[1]. Corn imports are projected to increase at a 2.77% annual rate versus the past rate of 10.77%; soybeans at 1.49% versus 11.62% and soybean meal at 17.29% versus –5.25%.

[1] 2001, Center for Agricultural and Rural Development, extracted from article, "NAFTA: Implications for Mexican and Midwestern Agriculture", Iowa Ag Review, Winter 2001.

The latest long-term projections by the United States Department of Agriculture foresee Mexican grain importation growing at the following compounded annual rates through 2012:[2]

Grain	CAGR
Corn	8.08%
Sorghum	2.40%
Wheat	3.35%
Rice	1.67%
Soybeans	5.16%

Note: CAGR – Compound Annual Growth Rate

As the Mexican economy and per-capita incomes grow, so does the consumption, driving increases in feed materials such as soybean meal,

It should be noted that government policies on both sides of the border continue to distort this trade in many ways. Significantly, corn production is subsidized in Mexico while corn exports are subsidized in the US. Under NAFTA, corn imports to Mexico are still subject to tariffs and quotas that are being phased out with elimination by the end of 2008. Tariffs and quotas on wheat, barley and malt, and soy and products were eliminated by end of 2003.

Modes of Transportation

The vast majority of grain imports to Mexico come from the US and Canada. By most accounts, the competition for transporting grain from the US to Mexico is quite keen. Since NAFTA, there has been significant privatization of transportation facilities along with improvements in both maritime and rail infrastructure as well as grain storage facilities in Mexico. There has also been some level of vertical integration. The result is that there is roughly a 65-35 split between water and rail transportation. Of the waterborne grain trades, approximately 85% moves to Mexico's Atlantic ports.

Generally, rail shipments are direct from US sources in unit-train quantities that go direct to customers in central Mexico. The water route for grain to Mexico's Atlantic ports is to be barged through the US to a Gulf port and transshipped to a bulk vessel for shipment to Mexico. Veracruz (1999) dominates the Atlantic ports for importation with approximately 62% share, Progreso being next at 17%.

Manzanillo is the largest grain port on the Pacific coast. Pacific ports generally handle grain from Western Canada and the Pacific Northwest of the US. Interestingly, in 1999, a new grain terminal (Comercializadora La Junta or CLJ) was built there with draft sufficient for 70,000 dwt ships and a potential future throughput capacity of 3 million tons per year. This terminal was financed partly by Canadian wheat interests and serves the import of wheat and canola. Australian canola arrives in this terminal at an estimated rate of 200,000 tons in year 2000. Mexico's Pacnav and Singapore-based Kuok Group are apparently set to build another new grain terminal in Manzanillo.

Veracruz is the major grain port on the Gulf port serving the central region of Mexico, and competing mainly with Tuxpan. Cargill acquired an unloading terminal from ALSUR. That terminal is equipped with

[2] USDA Agricultural Baseline Projections to 2012, Feb, 2003

high speed pneumatic unloaders. In addition, Terminales de Carga Especializada (TCE) operates another terminal which handles grains using ships' gear and two belt conveyors.

Although shippers, by most accounts, are very willing to shift their modes depending on frequent price fluctuations, there has been a slow, long-term shift towards rail. This may be due to several factors including increased integration of cross-border service and improved offerings, quality and cost savings by avoiding barge-to-ship and ship-to-rail transshipment and greater improvements realized in rail due to privatization. Interviews indicate that the US railroads (BNSF and UP) and their Mexican partners are making concerted efforts to capture this traffic.

Effect of Facilities Improvement

A recent study evaluated the possible effect on market share of deepening the Port of Veracruz to accommodate Panamax (50 to 80,000 dwt) vessels instead of the Handymax (40,000 dwt) vessels that now service the port[3]. The impacts on ocean freight (per ton shipped based on charter rates at the time of the study) are as follows:

Ocean Freight Rates to Veracruz for Different Size/Draft Vessels (USD per ton)

Load Port	40000 dwt Veracruz 10m	60000 dwt Veracruz 12m	80000 dwt Veracruz 14m
Rotterdam	$11.50	$9.32	$8.55
South Louisiana	$11.52	$9.33	$8.90
Quebec	$12.56	$10.03	$10.11
Rouen	$13.34	$11.63	$11.50
Rio Grande do Sul	$17.85	$13.55	$11.90
Rosario (with top-off)	$19.52	$16.32	N/A
Port Lincoln	$22.76	$17.09	N/A

Source: Seaport Consultants

The analysis of the cost situation in 2001 indicated a highly competitive situation comparing barge-ocean-rail routing through Veracruz to an all-rail route via BNSF through El Paso to Ferromex for shipments from St. Louis, MO to Mexico City. In short, the water route was cheaper for unit shipments of less than 110 rail cars but slightly more for larger movements.

Because of the highly efficient nature of US barge and terminal operations, further decreases in costs for the water route would need to come from better terminal operations in Veracruz, improvements in the Ferrosur route to Mexico City and use of larger, more efficient vessels for the maritime passage.

Estimated costs per ton using larger ships was estimated to be $37.84 for an 80,000 dwt ship and 38.68 for a 60,000 dwt ship versus $41.29 for a currently serviceable 40,000 dwt ship. This analysis did not include any increased port charges to defray the cost of the dredging and related improvements.

It should be kept in mind that charter rates for ships are highly volatile. USDA data indicates that Handysize and Handymax rates from the US Gulf to Mexico varied from $12/mt to $23/mt between 1997 and 2000.

The conclusion of the report was that a $40 million capital expenditure to deepen Veracruz could be cost effective principally due to the fact that accommodating larger vessels would lower voyage costs

[3] Transport Modes in US-Mexico Agricultural Trade: Grains and Perishables by Land and Ocean commissioned by *Economic Research Center, US Department of Agriculture* September 2002 Seaport Consultants, Inc.

sufficiently to allow for Mexico to diversify its sources of supply to include Canada, Argentina, Europe and Brazil.

Issues Impacting Projected Growth in Traffic to Veracruz

Several issues have been identified that could impact the accuracy of grain traffic projections for Veracruz. These are:

- Competitive position of Veracruz versus other Mexican ports and all-rail routes from the US.
- Continuation of growth in grain imports.

Results of Research and Interview Effort

I. Interviews

Interviews with US and Canadian shippers and Mexican consignees were conducted to gain their insight into these issues.

U.S. and Canadian shippers were unanimous in their emphasis on cost as the number one consideration with proximity to consignees (mills) as their next consideration. They were also quite positive in their outlook for continued growth in exports to Mexico. US railroads expressed their positive outlook as well as their emphasis on taking market share away from maritime transportation.

An interview with a major Mexican grain importer also highlighted the issues of cost, timeliness and infrastructure as critical in choosing a port. For US imports, the choice of transportation routing includes not just the all-in costs (transport, terminal operations, and cost from terminal to final destination) but also the price at the point of origin.

Veracruz was noted as having the best infrastructure, a good geographical position, good rail and road services and better service by the terminal operators and APIVER than any other Mexican port. Disadvantages were the vehicular congestion due to the position of the port to the city and the difficulty of operations during the "North" wind conditions. This importer sees annual growth of 3% in its maritime operations while railroads still need significant investments to grow their traffic. The vehicle congestion was emphasized.

II. Competitive Position of Veracruz

Among grain ports, choice of port appears to be based mainly on proximity to the mill taking delivery of the shipment. This appears to be even more important than cost. This may explain the greater diversity of ports used for grain imports compared to container traffic. Based on this, it appears that Veracruz has a clear and sustainable advantage for imports to its direct hinterland.

However, since the Valley of Mexico market cannot be served directly from any port, the all-in cost of transportation would be the deciding factor. Veracruz is the closest port and should maintain an advantage versus other Atlantic ports. As indicated above, railroads have aggressively attacked this market and gained share. Although there are limiting factors facing the railroads, they also have opportunities for further improvement that would make them more formidable competitors. The consensus opinion seems to be that rail and ocean cargo will continue to be keen competitors with volumes fluctuating with outside factors such as fuel prices, vessel charter rates and availability of rail cars.

Veracruz must offer cost reducing options to shippers to remain competitive. Serving larger vessels at Veracruz would reduce shipping costs as well as possibly open Mexico to other grain exporting countries in the Atlantic basin. Making new sources available would be of particular advantage since they would not face rail competition.

Other cost savings that can be realized in grain handling, storage and rail service to the Valley of Mexico would also increase Veracruz' competitiveness.

III. Continuation of Growth in Grain Imports

None of the research sources or interviewees saw any reason to expect a reduction or reversal in the growth of grain imports. However, the interviewees could not put numbers to their expectations. The sources sited above provided figures for corn and soy at reduced growth rates but higher rates for soybean meal.

Conclusions

There appears to be some consensus that grain shipments to Mexico will continue to grow despite a substantial slowing from the initial spurt brought on by NAFTA. Ongoing trends of population and economic growth will support increased consumption overall while higher meat consumption should support high growth in importation of feed grains. Despite an expectation of increased domestic support of peasant farmers, there is minimal expectation that Mexican grain production will significantly increase to displace imports.

Notably, new importation facilities have been built in Manzanillo that could open the Mexican market to imports from Australia and the Western US and Canada. Studies of potential shipping cost savings due to the use of larger vessels indicate that a deeper draft grain terminal at Veracruz could open the Mexican market to European and South American grain that would only be shipped to Atlantic ports.

In the face of deep-draft harbors on the Pacific coast and increased integration of the North American rail network, Veracruz needs to supply a lower cost solution than currently available. New facilities could, however, result in the creation of a new market opportunity as well as continued competitiveness in the existing markets.

2.5 Non-Food Bulk

This category of cargoes includes bulk materials such as mineral ores, fertilizer, and petroleum coke and scrap metal. Like grains, they are transported by chartered bulk carrier with port decisions resting largely on the issues of cost and proximity to origin/destination.

Two importers of non-food bulk were interviewed. Key issues identified by them included:

- Proximity to their plants is the most critical concern for them.
- The need for more deep-draft berths. Larger ships mean lower costs for them.
- Problems of congestion and interference from the railroad inside the port are major limitations to their efficiency.
- Delays due to customs and port bureaucracy are a problem, and the Port should consider investing in information technology as well as physical facilities.
- Railroads are not yet efficient enough to be competitive in the near term while trucking is reserved for high-value or time-sensitive shipments.

2.6 Neo-Bulk

These items include non-containerized, non-liquid or granular cargoes such as steel products, non-containerized forest products, and pipe and project equipment. Steel tubes are a significant export from the Port of Veracruz.

A significant exporter of steel pipe was interviewed. As with other shipping segments, this shipper noted the need for higher capacity ships. Vehicle congestion and interference with railroad movements inside the Port were identified as significant problems as well as the Port's location in the center of the city. Although, as above, this is identified as a problem, proximity to factories is also considered a key advantage of the Port. Customs and port bureaucracy were also cited as areas of concern.

2.7 Steel and Scrap Metal

The competitiveness of the Port of Veracruz for shipping these items is discussed as appropriate under the descriptions "Non-Food Bulk" and "Neo-Bulk." However, they are important cargoes at Veracruz and their outlook warrants some additional discussion.

In 2002, Mexico passed Britain to become the 16th largest steel producer in the world. Approximately 70% of that production takes place in electric furnaces. Mexico is also the world's 16th largest importer of steel (the United States being number one). Mexico is neither a major exporter of steel, nor a major net importer of steel.

The world steel trade as a percentage of total world production has grown steadily over thirty years.

Mexican Steel Industry Statistics ('000s metric tons)

	1992	2001	IV. CAGR
Scrap Consumption	N/A	6200	N/A
Scrap Imports	514	1547	13%
Steel Exports	1480	3994	12%
Steel Imports	2312	5305	10%
Iron Ore Imports	471	2292	19%
Crude Steel Production	8459	13292	5%

Source: International Iron and Steel Institute

This indicates impressive long-term growth despite the fact that 2001 was a relatively slow year for the Mexican steel industry. As can be seen, both imports and exports of (finished and semi-finished) steel have grown at a robust rate as have imports of inputs such as iron ore and scrap.

2.8 Automobiles

The automobile industry in Mexico is world-class and is integrated closely with the rest of the North American auto industry and the global industry. Statistics for 2003 show automobile production by eight manufacturers of 1.44 million units, off from 1.77 to 1.89 million in the years 2000 to 2002, but still well above a 1994 level of 1.09 million units. Exports of 1.09 million units were reported for 2003. Domestic sales of 850 thousand units were reported in 2003. Thus, Mexico is at the same time a major exporter and importer of automobiles and components. Automobiles and automobile components trade widely between Mexico and the United States, Brazil and Europe. NAFTA and the Mexico/EU free trade

agreement have greatly encouraged this trade. The Port of Veracruz is a center for both imports and exports.

Over $6 billion have been invested in the Mexican auto industry from foreign countries between 1999 and 2003. Production in Mexico has grown at the rate of 3 percent annually over the ten years to 2003. Over the same period, sales grew at 4 percent. More significantly, exports grew at a nearly 8 percent rate while imports grew at 25 percent.

The nature of automobile shipping is that, aside from adequate docking and draft, there are few facilities requirements. Car carriers have their own ramps and cars are driven from the ship. Space, however, is a key requirement. Cars must be driven to an area where they can be prepared for delivery and loaded onto trucks or rail cars for onward delivery. This is all space intensive and generates traffic within the port zone.

Interviews with auto shippers showed general requirements similar to those for other shippers. Cost and time in transit, based to a large extent on proximity to plants and markets, are the major determining factors. However, these shippers stressed their need for sufficiently large areas for holding cars and close proximity to the berth allowing their rapid movement. One interviewee used a figure of 200 cars per acre as a guideline. They also noted the importance for having a dedicated area inside of the port zone. This appears to be an advantage for Veracruz. Like others, the congestion inside the port zone was noted as a disadvantage. Interviews with shipping lines indicate that there is not a trend towards larger vessels in the Ro-Ro market.

A shipping line representative ranked balanced cargo (imports and exports) as the number one consideration in making a Port competitive. Following that were the ability to do all loading and unloading at the same berth, cost, speed and availability of qualified labor.

Due to improvements in rail service, most export shipments to the US are now by rail. However, there are possibilities a shown by the recent switch by Nissan from all-rail to a rail-to-Veracruz routing for shipments from their Aguas Calientes plant to the US. It should be noted that their experience with the rail link to Veracruz is very poor.

2.9 Competition from Rail

Veracruz faces competition from Mexican railroads in two areas. The first is by providing an all-land route from the US and Canada to Mexican markets, bypassing the Port of Veracruz. The second is by providing a land link to allow cargoes that would normally land at Veracruz to land in US Gulf or Atlantic ports that have advantages in terms of size, efficiency, frequency of ship calls, etc. Research and interviews have yielded the following information:

Grain Imports

Rail shipment of grain in Mexico has benefited from significant increases in productivity and infrastructure dating back to the 1990s. This is a particularly attractive business for railroads since grain often moves in large trainloads. Railroads are much more competitive in this area than in smaller lots. The Union Pacific Railroad is "giving incentives to customers to build new 100-car unit train facilities, or upgrading existing facilities, to improve the efficiency of their operations as well as our own." Combining the existing grain infrastructure in the US with new construction of inland terminals in Mexico allows the railroads to effectively serve their customers. It has also been noted that the pre-privatization freight rates of Mexican railroads tended to favor Veracruz over overland shipment since they reflected only distance and not difficulty of operations.

There is every reason to believe that this competition will increase as further improvements in the Mexican national rail system are made. The one limitation to this growth is the lack of northbound loads to balance the trade. This adds costs that increase with the size of the imbalance. Options available to

Veracruz include accommodating larger ships, increasing efficiency of operations in the port zone and speeding unloading. These actions would significantly reduce the cost of shipping through Veracruz, not only making it more competitive but opening the Mexican market to non-North American sources that would not be subject to rail competition.

Container Imports and Exports

Currently, shipping lines, shippers and consignees seem to feel that Houston is not a significant competitor to Veracruz in container shipping due to its remoteness from the Valley of Mexico. However, continuing improvements to the national rail system, including the development of more intermodal terminals, could change that situation. There already some significant intermodal services offered connecting the US and Mexico based largely on the needs of the auto industry. In 2003, the Union Pacific Railroad reported that approximately one third of its traffic to Mexico consisted of autos and auto parts with an additional ten percent from other intermodal services. In December 2003, the Union Pacific announced a new Los Angeles-Mexico intermodal service in conjunction with Ferromex. This would be six-day-a-week, seven day transit time from Los Angeles to Guadalajara and Mexico City via the El Paso/Ciudad Juarez border crossing. In February 2004, the same railroad announced enhanced information programs to expedite trans-border shipping.

Over the long term, there is every reason to expect more improvements in speed, service offerings and terminal facilities for intermodal traffic in Mexico. Combined with lower costs due to the use of larger vessels, this could eventually result in land bridge service from large US ports such as Houston or Savannah becoming competitive with Veracruz. Options available to Veracruz include any measures that tend to lower shipper's costs and improve their transit times.

It should also be noted that rail competition can serve as an advantage for Veracruz. To the extent that the rail service to the Valley of Mexico can be improved, this helps make Veracruz more competitive. Also, over the long term, improvements to the Port and its rail and road connections could apply to improving Veracruz's position to compete for business that now goes to Houston.

2.10 Overall Conclusions

- Use of Veracruz is driven primarily by cost, which is, in turn, driven by proximity to plants and markets. Because cost is always the most important factor, circumstances that would lower the cost of using another port sufficient to overcome a distance handicap will, ultimately, move business to another port or transportation mode. Addressing these limitations is as important as serving future demands in evaluating the improvements needed to maintain the health of the Port.

- There was little feedback from shippers or consignees to indicate that Altamira or Houston were currently competitors to Veracruz. However, it is conceivable that changes in future conditions could change that. A critical factor would be improvements in the railroad infrastructure that diminish Veracruz's advantage of proximity to the Valley of Mexico. Changes in relative efficiency (including customs and bureaucracy) and capacity would also tend to alter the competitive balance.

- Growth in trade through Veracruz will continue for the foreseeable future. Grain imports are expected to continue to grow as is the economy in general, driving demand for imports to the Valley of Mexico. Increasing efficiencies in the Mexican railroad sector have made it competitive in grain hauling and, in the long term, may make it competitive in intermodal traffic opening Veracruz to competition from US Gulf and Atlantic ports.

- Bulk shippers and consignees agree that the ability to handle larger vessels would result in lower shipping costs. Further, it can open world markets by making distant suppliers and markets more competitive. Current patterns of trade do not require larger capacity container vessels to call Veracruz. However, growth in traffic, the availability of more larger vessels, the lower costs of

using larger vessels and competitive pressures will, in the long term, provide increasing pressure to either accommodate them or lose businesses to ports that do.

- Most shippers and consignees interviewed cited congestion within the Port zone as a serious problem. In particular, interference between the railroad and trucks was of concern. The Port's location with respect to the City was also cited as a cause of congestion and delay.

Sources of Information

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Ing. Francisco Torres
Logística
VW de México

Mr. Ernesto Everardo Juárez
Gerente de Transportación y Logística
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VERACRUZ

3.0 Market Forecast for the Port of Veracruz

Introduction:

This section presents the results of the market forecast for the Port of Veracruz prepared by Michael L. Sclar Associates, Inc. in conjunction with DMJM Harris.

The forecast is based on detailed data on traffic through the Port of Veracruz from Journal of Commerce PIERS (JoC). The JoC data is forecast based on trade forecasts of Mexico trade by commodity and trade partner from Global Insight. Section 3.1 includes the unadjusted base data and forecasts for Mexico and the Port of Veracruz.

In Section 3.2, the unadjusted base data has been calibrated with the Port-reported trade data. In addition, the unadjusted base forecasts have been reviewed against the previous Port forecasts and adjustments based on shipper/consignee/carrier interviews and other sources and references have been incorporated. Section 3.2 includes the analysis and data utilized to calibrate the base data with reported data from the Port of Veracruz and to finalize the assumptions included in the adjusted forecast analysis.

The adjusted forecasts for both cargo and vessel calls are included in Section 3.3. The forecasts are based on the base data and assumptions from the previous sections applied to the vessel type and size, vessel call and balance and average tons per call analyses in Section 3.3.

Data Sources: The following data sources were utilized to develop the forecasts included in this report.

Mexico 1996 to 2001 - Based on OECD, UN and US trade data (Trade Measures,Inc.)
INEGI - Mexico 2002 trade based on data from INEGI plus Mexico port value data
Global Insight 1995 to 2021- History and forecast of Mexico trade
Base Data - Joc 2000-2002 - Detailed Port of Veracruz data
JoC May 2003 - Trade data for all Mexico ports
Port of Veracruz - Historical, current (2003) and forecast port data
Carriers, Shippers and Consignees - Interviews

Results:

The adjusted forecasts developed in Section 3.3 project cargo tons in the Port of Veracruz to increase from 16.3 million tons in 2002 to 33.5 million tons (base forecast), to 50.0 million tons (probable forecast) and to 84.9 million tons (optimistic forecast) by 2025. Vessel calls, especially containership calls, are projected to increase significantly from 1,623 in 2002 to 3,416 (base forecast), to 4,094 (probable forecast with bulk vessel size shift) and to 6,369 (optimistic forecast with bulk vessel size shift) by 2025. The forecasts include bulk vessel size shifts, which reflects an increase in channel depth that allows larger bulk carriers to serve the import grain trades at the probable and optimistic forecast levels. The containership calls maintain or increase their share of total calls even with a projected shift of containers to larger containerships. The Port of Veracruz will therefore need to be able to accommodate larger bulk vessels and a substantial increase in containership calls, especially larger containership calls, in order to achieve the probable and optimistic forecasts.

Overview

The following paragraphs summarize the analyses underlying the forecasts.

1. The first part of this forecast analysis focuses on total Mexico trade. Total trade for Mexico was developed based on data from OECD and INEGI converted to tons of cargo by Trade Measures, Inc. Data for 1996 to 2002 was developed and analyzed. Crude exports, which do not move through the Port of Veracruz, are a significant portion of total Mexico trade so the analysis included trade levels with and without crude oil. INEGI provided 2002 data and a summary of trade value by Mexican port for 2000 to 2002 (preliminary).

2. The total trade and Seaton trade for Mexico (Mexico seaborne trade) both historically from 1995 and forecast to 2021 were available from Global Insight. The historical data after 2000 in the Global Insight database are based on the forecasting models so the comparisons with OECD and INEGI data also provide a confirmation of the data used. Forecasts of the Global Insight trade data for 2021 to 2025 were based on the Global Insight forecast for 2020 to 2021.

3. The base data for the analysis is Journal of Commerce (JoC) data for the Port of Veracruz for 2000 to 2002. Comparisons of the JoC data with the Port of Veracruz data indicate that a portion of the vessels calling the Port of Veracruz are not recorded by the JoC system. The missing data is more significant for exports and in particular for exports in 2002. JoC data for May 2003 was also obtained for all of Mexico to provide a more current assessment of Mexico trade by port, carrier and shipper/consignee.

4. The JoC data for 2002 imports and 2001 exports (due to the missing 2002 export data) were forecast based on a match between the Global Insight forecasts and the JoC detail by commodity and trade partner. The forecasts are calculated by forecasting each individual Port of Veracruz shipment in the JoC database by the forecast for the commodity and trade partner trade with Mexico and aggregating the data by vessel type. This analysis provides an unadjusted base forecast for the Port of Veracruz which was analyzed and adjusted based on calibration of the data with the reported Port of Veracruz statistics and forecast assumptions based on information related to and from shippers and consignees, including interviews.

5. The Port of Veracruz data provided detail utilized to calibrate the forecast analysis. Data on vessel calls for December 2001 and 2002 were compared with the JoC vessel calls, cargo by vessel type and commodity were used to analyze historical trends for the Port of Veracruz and align the forecasts. In addition, the Port of Veracruz statistics provided detail for analyzing the container tare weights and empty containers included in the port statistics but not in the JoC database. Finally, a review was made of the previous port forecasts (Development Plan for Port of Veracruz, prepared for APIVER by INOPESA, 2000) to assure that all significant previous assumptions and projections were considered as part of this analysis.

6. The analysis next focused on several perspectives on the Port of Veracruz trade including: viaport analysis (viaports are the first port of discharge and the last port of loading reported in the JoC data) and possible feeder and transshipment activities, container and non-container trends by commodity, May 2003 port shares, Global Insight Mexico TEU forecasts by trade area, May 2003 TEUs by Mexico port and trade partner region and full year 2003 reported trade data for the Port of Veracruz.

7. Based on the previous analyses the unadjusted base forecasts were adjusted to calibrate with the base data for the Port of Veracruz and probable and optimistic adjusted forecasts were developed.

8. Final assumptions with respect to the growth rates and forecast scenarios have been developed based on information from the shippers and carriers in the Mexico foreign trades. The shippers, consignees and carriers for key trades were used for direct market research and surveys. Commodities included are grain imports, auto imports, oilseed imports, scrap imports, fertilizer imports, auto exports, and iron and steel exports and imports.

9. The adjusted forecasts were used to develop forecasts by vessel type and size. The analysis included review of the cargo carried by vessel type and size in total and by trade partner. In addition vessel call balances and ballast calls were analyzed.

10. The unadjusted base vessel calls were combined with the adjusted trade forecasts to develop vessel call forecasts by projection scenario. Adjustments to vessel type and size and tons per vessel call were included in this analysis. In addition, ballast calls in both direction were included and a shift of grain to larger bulk vessels and containerized cargo to larger containerships were also included in the probable and optimistic forecasts. Summary forecasts of tons and vessel calls finalize the analysis in Section 3.3.

Findings:

The following are the important findings:

- The adjusted base forecast falls slightly below the previous pessimistic forecast in terms of total tons in 2025. However, the base forecast of container cargo is between the pessimistic and probable forecast. The primary difference is the forecast for grain imports. The Global Insight forecasts show relatively low growth rates for grain imports. However, if under NAFTA, grain imports from the US and Canada continue to be more competitive in Mexico and with channel deepening larger bulk vessels can deliver grain cost competitively from the US Gulf and other markets, the growth of grain imports could increase substantially. The final analysis of the grain forecast was based on additional trade data and shipper interviews.

- Container trades are most represented by line haul routes with Europe and the East Coast of South America and regional services within the Caribbean Basin (including the US). The container trades with Asia are primarily routed through Mexico west coast ports. Europe trade is primarily routed through the Port of Veracruz. While the Port of Veracruz is well situated to handle Valley of Mexico including Mexico City imports, some European trade, especially with northern Mexico, is routed through Altamira. A preliminary competitive analysis of Altamira indicated the same carriers serve Veracruz and Altamira with the higher level of imports at Veracruz and higher exports at the last export port of call at Altamira for some carriers. The Port of Altamira was further evaluated and is not expected to impact the Port of Veracruz forecast growth. Similarly the interviews indicated limited impact from the Port of Houston via rail intermodal.

- Container trade growth rates with Europe and South America projected by Global Insight are slightly lower than the trade growth with Asia. Increasing the container forecast growth to the national average increases the container forecast to the previous probable forecast.

- The final projections of total Port of Veracruz tons in 2025 are approximately 14.3% to 18.9% below the previous forecasts (Development Plan for Port of Veracruz, prepared for APIVER by INOPESA).

- Vessel sizes serving the Port of Veracruz are generally in the medium vessel size range. The key Veracruz trades are generally well served by such vessel sizes, with the exception of grain and the global trends toward larger containerships. As a result, no increase in the vessel size distributions is currently projected except for bulk vessels and containerships under the probable and optimistic forecasts. Vessel calls are projected to at least double between 2002 and 2025 and will quadruple for some container ship sizes under the probable forecast, despite the projected increases in vessel size. Due to growth and imbalances, especially in the regional container trades, the tons per call for export container cargo is projected to increase to offset the imbalance.

- The principal forecast results indicate the Port of Veracruz will need to accommodate larger bulk vessels for the carriage of grain and substantial increases in containership calls at the Port of Veracruz.

3.1 Unadjusted Base Ton Analysis - Mexico and Veracruz

This Section includes the analysis of base trade data for Mexico and the Port of Veracruz and the unadjusted base forecast for the Port of Veracruz.

Section 3.1 includes historical Mexico trade data and forecasts of Mexico total tons and seatons which are applied to Port of Veracruz JoC detail to produce unadjusted base forecasts by vessel type.

Sections 3.2 and 3.3 develop the adjustments to the forecast to account for reporting differences, vessel type shifts and other factors

3.1.1 Mexico Trade History

The following Table 3-1A summarizes recent trade history for Mexico. The data is based on OECD and UN trade statistics for 1996 to 2001 and Mexico trade data for 2002 obtained from INEGI. For purposes of this analysis the data, which is reported in a variety of units, has been converted to metric tons by Trade Measures, Inc. The table shows the Mexico trade data net of HS 27 (Petroleum Products).

As shown in the Table 3-1A, Mexico trade grew at very significant rates through 1999 and has increased at more modest rates between 1999 and 2002. This pattern is generally confirmed by data from INEGI, Joc, and other sources.

The second part of the table shows the Global Insight historical data for total and non petroleum trade. The Global Insight data are the historical base data for the forecasts of Mexico trade and are based primarily on UN trade data.

The Global Insight historical exports are higher than the OECD-UN-INEGI historical trade processed by Trade Measures, while the imports are lower. The differences occur as a result of the variations in data sources, the scope of trade reported in each source and the conversion of trade data reported in value to tonnage, including cross boarder trade. However, the patterns of historical trade growth are similar by direction and in total.

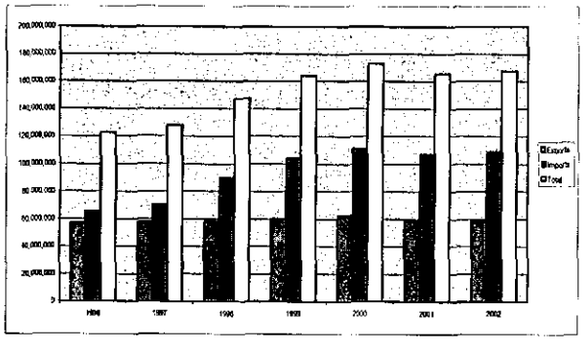
3.1.2 Mexico Non-Petroleum Trade

The following Table 3-1 and Chart 3-1A show total Mexico trade in tons for the period 1996 to 2002. This data is based on trade data from the OECD, UN and US for the years 1996 to 2001. 2002 is based on data from INEGI. The trade data in these series that was not reported in tons was converted to tonnage by Trade Measures, Inc.

Table 3-1A
Total Mexico Non Petroleum Trade 1996 to 2002
Source: Trade Measures, OECD, UN, INEGI
(Metric Tons)

Mexico Non Petroleum Product Trade	1996	1997	1998	1999	2000	2001	2002	CAGR9699	CAGR9902	CAGR9602
Exports	56,772,315	57,483,501	57,936,326	59,896,779	62,094,459	58,528,691	58,338,540	1.80%	-0.87%	0.45%
Imports	65,673,108	70,015,394	89,404,555	103,923,177	110,732,510	106,861,264	108,953,837	16.53%	1.59%	8.80%
Total	122,445,423	127,498,895	147,340,881	163,819,956	172,826,969	165,389,955	167,292,377	10.19%	0.70%	5.34%
Exports		1.25%	0.79%	3.38%	3.67%	-5.74%	-0.32%			
Imports		6.61%	27.69%	16.24%	6.55%	-3.50%	1.96%			
Total		4.13%	15.56%	11.18%	5.50%	-4.30%	1.15%			

Chart 3-1
Total Mexico Non Petroleum Trade 1996 to 2002



3.1.3 INEGI Trade Summary

The following table shows the total tons of Mexico trade from the Global Insight trade forecasts included in Table 3-3. The Global Insight historical export figures for non crude tons are higher than the OECD/UN/INEGI data while the import figures in the Global Insight data are lower. The differences result from differences in reported data and the processing of value reported data including cross border trades.

Table 3-1B
Global Insight Trade History

	1996	1997	1998	1999	2000	2001	2002	CAGR9699	CAGR9902	CAGR9602
Export Total	121,068,101	143,561,704	143,725,261	138,351,935	146,228,111	148,413,202	155,548,948	4.55%	3.98%	4.27%
Export Crude/NtlGas	63,272,886	84,390,565	84,003,314	78,313,210	80,556,996	84,315,118	90,146,119	7.37%	4.80%	6.08%
Export Non Crude/NtlGas	57,795,215	59,171,138	59,721,947	60,038,725	65,671,114	64,098,084	65,402,829	1.28%	2.89%	2.08%
	1996	1997	1998	1999	2000	2001	2002	CAGR9699	CAGR9902	CAGR9602
Import Total	58,735,579	66,249,938	82,938,812	86,542,406	92,967,857	90,086,829	90,698,115	13.79%	1.58%	7.51%
Import Crude/NtlGas	1,907,021	1,792,131	1,664,528	2,351,100	2,529,036	3,076,630	3,458,171	7.23%	13.73%	10.43%
Import Non Crude/NtlGas	56,828,559	64,457,807	81,274,284	84,191,306	90,438,821	87,010,199	87,239,944	14.00%	1.19%	7.41%
	1996	1997	1998	1999	2000	2001	2002	CAGR9699	CAGR9902	CAGR9602
Total Tons	179,803,680	209,811,642	226,664,073	224,894,341	239,195,967	238,500,031	246,247,063	7.74%	3.07%	5.38%
Total Crude/NtlGas	65,179,907	86,182,696	85,667,842	80,664,310	83,086,032	87,391,748	93,604,290	7.36%	5.08%	6.22%
Total Non Crude/NtlGas Tons	114,623,774	123,628,945	140,996,232	144,230,031	156,109,936	151,108,283	152,642,773	7.96%	1.91%	4.89%
		7.9%	14.0%	2.3%	8.2%	-3.2%	1.0%			

The following Table 3-2A shows the summary of Mexico trade value for Mexico and the Port of Veracruz between 2000 and 2002 (preliminary). The table highlights the recent subdued growth trends and the somewhat stronger performance of the Port of Veracruz in this period.

Tables 3-2B and 3-2C provide data from the Port of Veracruz for 2003 which indicate continued strong performance by the Port of Veracruz in 2003. Table 3-2B shows 12 month total data for the Port of Veracruz which shows the Port of Veracruz is on path to show tonnage growth (3.38%) during the weak economic period of 2003. The Port of Veracruz reported growth in grain imports for 2003 is 2.37%, as shown in Table 3-2C.

Based on the current data, the Port of Veracruz appears to continue to gain market share and to increase cargo volumes in a challenging economic period.

Table 3-2A
Mexico Trade Value by Port
Source: INEGI 2000 to 2002P

	2000	2001	2002 /P
Export	166,454,818	158,442,865	160,682,013
Veracruz	4,971,929	4,879,935	5,237,203
Veracruz %	2.99%	3.08%	3.26%
Import	174,457,811	168,396,460	168,678,857
Veracruz	8,157,251	8,616,562	9,391,237
Veracruz %	4.68%	5.12%	5.57%

Source: INEGI

Table 3-2B
Port of Veracruz 2003 Total Tons

	Export	Import	Total
2002	2,663,937	13,297,554	15,961,491
2003	2,639,015	13,861,346	16,500,361
	-0.94%	4.24%	3.38%

Source: Port of Veracruz

Table 3-2C
Port of Veracruz 2003 Grain Tons
(Imports of Rice, Maize, Canola Seeds, Sunflower Seeds, gorghum, Soy, and Wheat)

2002	5,798,916
2003	5,936,226
	2.37%

Source: Port of Veracruz

3.1.4 Calibration of 2002 Data

The JoC database for 2000 to 2002 is calibrated with the reported data from the Port of Veracruz in the following sections. The JoC data is used as a base because it provides detailed trade data including commodity, origin-destination, vessel type and size, and shipper/carrier information by sailing which can be combined with trade forecasts to project future Port of Veracruz traffic volumes with that level of detail. However, due to differences in reporting of data by the Port of Veracruz and the JoC, it was necessary to calibrate the JoC data to adjust for empty container weights, tare weights and reporting gaps.

Comparisons of the JoC data with the reported data from the Port of Veracruz indicated several steps required to calibrate the data. The comparisons included both tonnage comparisons and comparisons of the reported vessel calls.

First the JoC data for 2002 for the Port of Veracruz were found to be missing a portion of the vessel calls, especially in the export direction. As a result the data for 2002 exports were replaced with 2001 data forecasted to 2002 with the Global Insight forecasts and factors for the remaining missing calls were calculated by direction.

Second, the reported container data from the Port of Veracruz include the tare weights of containers as well as the weight of empty containers which are not included in the JoC data. Estimates of the tare weights and the weights of empties were calculated for inclusion in the base data.

3.1.5 Total Ton Forecast

The following Table 3-3 summarizes the total ton forecast for Mexico prepared by Global Insight between 1995 and 2025. Total tons include international trade by all modes (air, land and sea). The forecasts for 2021 to 2025 are based on the Global Insight growth rates for 2020 to 2021.

Table 3-3 also develops the forecast of total tons with and without crude oil. As can be observed in the table, the forecasts for Mexico crude trade shows relatively little long term growth. Non crude trade is projected to grow at higher rates.

Long term (2002 to 2025) total tons are projected to grow at 2.8% and crude oil is projected to increase at 0.9% per year. Without the crude oil, total Mexico trade is projected to grow at 3.6% per year. Non crude exports are projected to increase at 4.2% per year between 2002 and 2025, non crude imports are projected to increase at 3.2% per year and total non crude tons are projected to increase at 3.6% per year over the forecast period.

Table 3-3
Global Insight Mexico Total Ton Forecast
1995 to 2025

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Export Total	113,826,565	121,068,101	143,561,704	143,725,261	138,351,935	146,228,111	148,413,202	155,548,948	158,552,695	162,629,811	166,602,680	170,860,380	175,214,432	179,739,879	184,415,483	189,231,597
Export Crude	61,251,737	62,490,865	84,200,769	83,514,102	77,049,604	80,243,206	83,985,569	89,831,392	90,627,341	92,070,314	93,239,869	94,368,686	95,451,327	96,509,089	97,567,767	98,603,243
Export Non Crude	52,574,828	58,577,216	59,360,935	60,211,159	61,302,331	65,984,904	64,427,633	65,717,556	67,925,344	70,559,297	73,362,811	76,491,694	79,763,105	83,230,790	86,847,717	90,628,355

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Import Total	46,010,805	58,735,579	66,249,938	82,938,812	86,542,406	92,967,857	90,086,829	90,698,115	92,890,007	95,664,604	98,649,964	102,215,647	105,998,744	109,959,183	114,001,233	118,154,551
Import Crude	88	36,492	788	775	183,411	192,439	193,189	193,603	197,029	199,699	202,303	204,841	207,456	210,078	212,610	215,060
Import Non Crude	46,010,717	58,699,087	66,249,150	82,938,037	86,358,995	92,775,418	89,893,640	90,504,511	92,692,978	95,464,905	98,647,561	102,010,806	105,791,288	109,749,105	113,788,622	117,939,492

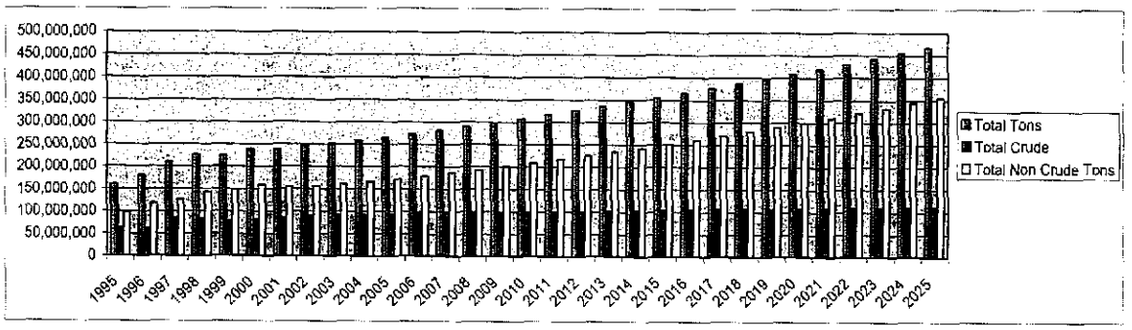
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Tons	159,837,370	179,803,680	209,811,642	226,664,073	224,894,341	239,195,967	238,500,031	246,247,063	251,442,692	258,294,215	265,452,644	273,076,027	281,213,176	289,699,061	298,416,716	307,386,149
Total Crude	61,251,825	62,527,377	84,201,557	83,514,877	77,233,015	80,435,645	84,178,758	90,024,995	91,024,370	92,270,013	93,442,172	94,573,527	95,658,783	96,719,166	97,780,377	98,818,303
Total Non Crude Tons	98,585,545	117,276,303	125,610,085	143,149,196	147,661,326	158,760,322	154,321,272	156,222,068	160,418,321	166,024,202	172,010,472	178,502,500	185,554,393	192,979,895	200,636,339	208,567,846
		19.0%	7.1%	14.0%	3.2%	7.5%	-2.8%	1.2%	2.7%	3.5%	3.6%	3.8%	4.0%	4.0%	4.0%	4.0%

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	CAGR02to25
Export Total	194,250,702	199,363,517	204,599,415	209,941,887	215,410,384	221,020,871	226,752,173	232,611,665	238,605,238	244,745,365	251,068,166	257,554,312	264,208,023	271,033,626	278,035,564	2.6%
Export Crude	99,671,524	100,699,897	101,692,066	102,636,251	103,549,042	104,424,582	105,261,635	106,057,749	106,812,587	107,534,926	108,225,047	108,919,598	109,618,606	110,322,100	111,030,108	0.9%
Export Non Crude	94,579,178	98,663,619	102,907,350	107,305,636	111,861,342	116,596,288	121,490,539	126,553,916	131,792,652	137,210,439	142,843,119	148,707,028	154,811,659	161,166,894	167,783,020	4.2%

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	CAGR02to25
Import Total	122,392,919	126,634,037	130,936,680	135,328,036	139,755,544	144,249,433	148,807,981	153,419,193	158,079,651	162,784,814	167,664,302	172,690,054	177,866,453	183,198,015	188,689,390	3.2%
Import Crude	217,546	219,931	222,233	224,535	226,793	229,032	231,250	233,444	235,616	237,795	260,195	284,706	311,525	340,871	372,981	2.9%
Import Non Crude	122,175,373	126,414,106	130,716,447	135,103,500	139,528,751	144,020,401	148,576,730	153,185,748	157,844,046	162,547,019	167,404,107	172,406,331	177,558,026	182,863,660	188,327,832	3.2%

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	CAGR02to25
Total Tons	316,643,621	325,997,553	335,536,096	345,269,923	355,165,929	365,270,303	375,560,154	386,030,857	396,684,900	407,530,178	418,732,468	430,244,366	442,074,475	454,231,641	466,724,955	2.8%
Total Crude	99,889,070	100,919,828	101,914,299	102,860,786	103,775,835	104,653,614	105,492,885	106,291,193	107,048,203	107,772,720	108,485,242	109,204,303	109,930,131	110,662,971	111,403,090	0.9%
Total Non Crude Tons	216,754,551	225,077,725	233,623,796	242,409,137	251,390,094	260,616,689	270,067,268	279,739,664	289,636,697	299,757,458	310,247,226	321,113,359	332,369,685	344,030,554	356,110,852	3.6%
	3.9%	3.8%	3.8%	3.8%	3.7%	3.7%	3.6%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	

Chart 3-2
Global Insight Mexico Total Ton Forecast
1995 to 2025



3.1.6 Seaton (Seaborne Ton) History and Forecast

As shown in Table 3-4 below, Mexico seatons (seaborne trade) represented 32.0% of non crude tons in 2002. The Seaton share of non crude imports fell to 22.0% and the Seaton share of non crude exports rose to 45.7% over the past 7 years.

The following Table 3-5 summarizes the Global Insight forecast of Seatons (tons entering and leaving Mexico by sea). As shown in the table, the forecast total Seatons (net of crude oil) are projected to increase at 2.8% between 2002 and 2025. Imports are projected to grow at 3.0% and exports at 2.6% without crude.

Note the forecasts through 2021 are based on Global Insight forecasts. The forecasts for 2022 to 2025 in Table 5 are based on the Global Insight growth rate for 2020 to 2021.

Table 3-4
Global Insight Mexico Seaton (Seaborne Ton) History
1995 to 2002

	1995	1996	1997	1998	1999	2000	2001	2002
Export Total	113,826,565	121,068,101	143,561,704	143,725,261	138,351,935	146,228,111	148,413,202	155,548,948
Export Crude	61,251,737	62,490,885	84,200,769	83,514,102	77,049,604	80,243,206	83,985,569	89,831,392
Export Non Crude	52,574,828	58,577,216	59,360,935	60,211,159	61,302,331	65,984,904	64,427,633	65,717,556
	1995	1996	1997	1998	1999	2000	2001	2002
Import Total	46,010,805	58,735,579	66,249,938	82,938,812	86,542,406	92,967,857	90,086,829	90,698,115
Import Crude	88	36,492	788	775	183,411	192,439	193,189	193,603
Import Non Crude	46,010,717	58,699,087	66,249,150	82,938,037	86,358,995	92,775,418	89,893,640	90,504,511
	1995	1996	1997	1998	1999	2000	2001	2002
Total Tons	159,837,370	179,803,680	209,811,642	226,664,073	224,894,341	239,195,967	238,500,031	246,247,063
Total Crude	61,251,825	62,527,377	84,201,557	83,514,877	77,233,015	80,435,645	84,178,758	90,024,995
Total Non Crude Tons	98,585,545	117,276,303	125,610,085	143,149,196	147,661,326	158,760,322	154,321,272	156,222,068
		19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
	1995	1996	1997	1998	1999	2000	2001	2002
SeatonExp	13,575,940	17,254,554	20,488,257	28,753,736	29,185,357	30,902,061	29,540,461	30,004,554
SeatonImp	22,026,436	26,410,544	24,915,082	22,140,145	19,182,575	20,183,891	19,728,431	19,938,972
SeatonTot	35,602,376	43,665,098	45,403,339	50,893,881	48,367,932	51,085,952	49,268,892	49,943,527
	1995	1996	1997	1998	1999	2000	2001	2002
Seaton%of NonCrd Exp	25.8%	29.5%	34.5%	47.8%	47.6%	46.8%	45.9%	45.7%
Seaton%of NonCrd Imp	47.9%	45.0%	37.6%	26.7%	22.2%	21.8%	21.9%	22.0%
Seaton%of NonCrd Tons	36.1%	37.2%	36.1%	35.6%	32.8%	32.2%	31.9%	32.0%

Table 3-5
Global Insight Mexico Seaton (Seaborne Ton) Forecast
Sea Tons 1995 to 2025

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Imp Total	13,575,941	17,255,284	20,468,273	28,753,751	29,350,709	31,076,475	29,715,093	30,180,713	30,880,798	31,669,220	32,527,414	33,525,748	34,644,294	35,821,501	37,009,710	38,230,174
		27.10%	18.74%	40.34%	2.08%	5.88%	-4.38%	1.56%	2.32%	2.55%	2.71%	3.07%	3.34%	3.40%	3.32%	3.30%
Exp Total	80,218,799	85,662,145	103,689,271	100,466,223	91,456,378	95,502,885	98,567,434	104,265,415	105,571,833	107,264,571	108,872,632	110,522,725	112,128,863	113,727,727	115,343,398	116,951,115
		6.79%	21.06%	-3.12%	-8.97%	4.43%	3.21%	5.78%	1.25%	1.60%	1.50%	1.52%	1.45%	1.43%	1.42%	1.39%
Total	93,794,740	102,917,429	124,157,544	129,219,974	120,806,088	126,579,360	128,283,527	134,446,127	136,452,631	138,933,791	141,400,046	144,048,473	146,772,957	149,549,229	152,353,108	155,181,289
		9.73%	20.67%	4.05%	-6.51%	4.78%	1.35%	4.80%	1.49%	1.82%	1.78%	1.87%	1.89%	1.89%	1.87%	1.86%

Import	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Crude	2	730	16	16	165,352	174,415	175,632	176,158	179,241	181,643	183,987	186,271	188,625	190,984	193,254	195,469

Export	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Crude	58,192,363	59,251,601	78,784,185	78,326,078	72,272,603	75,316,994	78,839,003	84,326,442	85,250,984	86,404,025	87,486,932	88,535,434	89,545,653	90,535,421	91,527,166	92,497,172
Without Crude																
W/O Crude	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Import	13,575,940	17,254,554	20,468,257	28,753,736	29,185,357	30,902,061	29,540,461	30,004,554	30,701,557	31,487,577	32,343,427	33,339,477	34,455,669	35,630,517	36,816,446	38,034,705
Export	22,026,436	26,410,544	24,915,082	22,140,145	19,182,575	20,183,891	19,728,431	19,938,972	20,320,849	20,860,546	21,383,700	21,987,291	22,583,010	23,192,307	23,816,233	24,453,943
Total	35,602,376	43,665,098	45,403,339	50,893,881	48,367,932	51,085,952	49,268,892	49,943,527	51,022,406	52,348,123	53,727,128	55,326,768	57,038,679	58,822,824	60,632,679	62,488,649
Import		27.1%	18.7%	40.3%	1.5%	5.9%	-4.4%	1.6%	2.3%	2.6%	2.7%	3.1%	3.3%	3.4%	3.3%	3.3%
Export		19.9%	-5.7%	-11.1%	-13.4%	5.2%	-2.3%	1.1%	1.9%	2.7%	2.5%	2.8%	2.7%	2.7%	2.7%	2.7%
Total		22.6%	4.0%	12.1%	-5.0%	5.6%	-3.6%	1.4%	2.2%	2.6%	2.6%	3.0%	3.1%	3.1%	3.1%	3.1%

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Imp Total	39,478,033	40,723,030	41,993,717	43,290,588	44,602,768	45,937,058	47,297,854	48,679,760	50,086,502	51,518,736	53,028,193	54,581,873	56,181,075	57,827,192	59,521,417	3.0%
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exp Total	118,598,879	120,222,797	121,825,380	123,392,122	124,949,507	126,486,716	128,000,267	129,488,819	130,950,350	132,394,896	133,824,761	135,270,274	136,731,400	138,208,309	139,701,171	1.3%
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	158,076,912	160,945,827	163,819,097	166,682,710	169,552,275	172,423,774	175,297,941	178,168,599	181,036,852	183,913,434	186,852,954	189,839,457	192,873,894	195,956,428	199,088,433	1.7%
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Import	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Crude	197,707	199,854	201,928	204,001	206,034	208,051	210,049	212,025	213,980	215,542	237,110	260,353	285,875	313,898	344,669	3.0%

Export	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Crude	93,494,760	94,454,135	95,379,127	96,257,984	97,107,308	97,921,374	98,700,496	99,441,689	100,144,408	100,816,689	101,459,878				
Without Crude															
W/O Crude	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025 CAGR02to21	
Import	39,280,326	40,523,176	41,791,790	43,086,587	44,396,734	45,729,007	47,087,805	48,467,755	49,872,522	51,302,796	52,791,083	54,322,544	55,896,433	57,520,038	59,186,686	3.0%
Export	25,104,100	25,768,662	26,446,253	27,134,138	27,842,199	28,565,341	29,299,751	30,047,130	30,805,942	31,578,008	32,364,883	33,171,366	33,997,950	34,845,128	35,713,417	2.6%
Total	64,384,425	66,291,838	68,238,042	70,220,726	72,238,933	74,294,348	76,387,556	78,514,885	80,678,464	82,880,803	85,155,966	87,493,585	89,896,374	92,363,096	94,898,557	2.8%
Import	3.3%	3.2%	3.1%	3.1%	3.0%	3.0%	3.0%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	
Export	2.7%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	
Total	3.0%	3.0%	2.9%	2.9%	2.9%	2.8%	2.8%	2.8%	2.8%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	

3.1.7 Unadjusted Base Forecast

The following table summarizes the unadjusted base forecast for the Port of Veracruz based on the Global Insight projections and the Journal of Commerce data for the Port of Veracruz. In subsequent sections, the unadjusted base forecast is calibrated with reported Port of Veracruz reported data and shipper interviews to generate the adjusted forecast.

The procedures used to generate the unadjusted base forecast included matching each record in the JoC data with the appropriate long term forecast by commodity and trade partner and direction and projecting the base tons at the growth rate from the forecast. For example, the forecast growth rate for a given commodity between Spain and Mexico is applied to each shipment of that commodity between the Port of Veracruz and Spain. The resulting detail is aggregated in the following tables to the total trade forecast and trade by vessel type.

The resulting forecasts therefore reflect higher rates of growth for containerized trade with Asia compared with Europe and the forecast for the Port of Veracruz reflects the projected growth rates for the Port of Veracruz commodities and trade partners. The computation of the 5 year forecasts of trade for the Port of Veracruz are based on Global Insight forecasts through 2020 and the 2025 figures are based on the growth between 2015 and 2020.

The unadjusted base forecast for the Port of Veracruz projects an increase from 13.2 million tons in 2002 to 26.4 million tons in 2025, a CAGR of 3.1%. While total exports are projected to increase at 3.5% versus 3.0% for total imports, imports to the Port of Veracruz are projected to continue to substantially exceed exports for the forecast period.

Unadjusted Port of Veracruz Base Format
Table 3-6 provides the unadjusted base forecast developed from the forecast of the detailed JoC data for the Port of Veracruz based on the projected growth by commodity, trade partner and direction from the Global Insight forecast.

This procedure generates the unadjusted base forecast which is adjusted in the following sections. Adjustments are developed in the next sections and applied to the base forecasts. The forecast adjustments reflect actual port data and shipper/carrier interviews. The adjustments fall into two categories. First, the base tons are calibrated to the reported trade for the Port of Veracruz. Adjustments are also required to account for container tare weights and empty containers and for vessel calls not captured by the JoC database.

Table 3-6
Unadjusted Port of Veracruz Base Forecast

	2001	2002	2005	2010	2015	2020	2025	
Export	1,743,131	1,733,505	1,885,273	2,271,792	2,710,702	3,219,970	3,863,021	3.5%
		2002	2005	2010	2015	2020	2025	
Import		11,443,924	12,423,910	14,707,598	17,142,887	19,567,318	22,521,706	3.0%
		2002	2005	2010	2015	2020	2025	
Total		13,177,428	14,309,183	16,979,390	19,853,589	22,787,288	26,384,727	3.1%

3.1.8 Unadjusted Base Forecast by Vessel Type

The following two tables show the summation of the unadjusted base forecasts by vessel type and the forecasts of container cargo and non container cargo by vessel type. These tables are the result of forecasting the individual shipments included in the JoC database with the long term growth projected by Global Insight by commodity and trade partner. The forecasts of the individual shipments are then aggregated by the vessel type on which the shipment moved.

Table 3-7 summarizes the forecast of tons by vessel type. In Table 3-8, the forecast containerized tons and non containerized tons are separately summarized by vessel type.

Table 3-7 shows the unadjusted base forecast for Port of Veracruz exports is 3.5% per year between 2002 and 2025, the unadjusted base forecast for imports is 3.0% and the unadjusted base forecast for total tons is 3.1%. Table 3-8 shows the base export and import container growth are forecast at 4.4% per year and base export and import non container growth are forecast at 2.3% and 2.5%, respectively. Total container growth is 4.4%, total non-container growth is 2.5%, and total trade growth is 3.1%.

The data in Table 3-8 show containerized and non containerized cargo by vessel type. Thus the tons shown under export container on bulk vessels represent containerized tons carried in containers on a bulk carrier. Similarly small amounts of containerized cargo are carried on car carriers and non containerized cargo are carried on containerships. As expected, most containerized cargo is carried on containerships, followed by general cargo vessels and RoRo vessels.

It should be noted that the forecasts in Tables 3-7 and 3-8 are the unadjusted base forecasts for the Port of Veracruz. In subsequent sections the base data is calibrated with the reported Port of Veracruz data and the forecasts are further adjusted to reflect additional inputs from the shipper and carrier interviews and review of additional forecasts and data sources. The adjusted forecasts represent the probable and optimistic forecasts for the Port of Veracruz.

Table 3-7
Unadjusted Base Forecast by Vessel Type

Export

VesselGroup	2001	2002	2005	2010	2015	2020	2025	CAGR02to25
CONTAINER	848,921	847,619	954,304	1,204,469	1,493,056	1,835,783	2,274,140	4.4%
GENERALCARGO	489,601	462,453	461,699	502,718	550,058	600,197	662,847	1.6%
CARCARRIER	212,881	216,792	258,183	332,412	410,779	501,372	612,729	4.6%
BULK	80,880	83,997	82,380	86,807	92,153	97,109	102,641	0.9%
TANKER	75,706	91,271	96,083	106,206	117,706	129,306	142,556	2.0%
RORO	18,458	17,351	18,845	23,917	30,036	37,561	47,378	4.5%
UNKNOWN	10,394	9,713	9,443	10,203	11,079	11,939	12,926	1.3%
OTHER	5,099	3,179	3,265	3,953	4,700	5,554	6,637	3.3%
PRODUCT	1,192	1,128	1,070	1,106	1,135	1,151	1,167	0.1%
	1,743,131	1,733,505	1,885,273	2,271,792	2,710,702	3,219,970	3,863,021	3.5%

Import

VesselGroup	2002	2005	2010	2015	2020	2025	
BULK	6,688,328	7,253,599	8,333,594	9,416,273	10,427,554	11,615,609	2.4%
CONTAINER	2,218,889	2,450,116	3,146,950	3,936,710	4,786,746	5,869,251	4.3%
GENERALCARGO	1,345,165	1,420,029	1,653,904	1,922,218	2,198,198	2,543,124	2.8%
TANKER	634,831	708,119	869,726	1,036,486	1,195,457	1,381,738	3.4%
CARCARRIER	261,419	268,302	312,136	365,577	420,242	484,885	2.7%
PRODUCT	191,112	211,649	254,953	298,844	341,221	390,484	3.2%
RORO	86,794	93,823	115,555	142,942	170,921	205,809	3.8%
UNKNOWN	12,095	13,051	14,980	17,016	19,043	21,487	2.5%
OTHER	5,290	5,223	5,801	6,822	7,935	9,320	2.5%
	11,443,924	12,423,910	14,707,598	17,142,887	19,567,318	22,521,706	3.0%

Total

	2002	2005	2010	2015	2020	2025	
BULK	6,772,326	7,335,979	8,420,401	9,508,426	10,524,662	11,718,250	2.4%
CONTAINER	3,066,508	3,404,420	4,351,419	5,429,765	6,622,528	8,143,391	4.3%
GENERALCARGO	1,807,619	1,881,728	2,156,622	2,472,276	2,798,395	3,205,972	2.5%
TANKER	726,102	804,203	975,932	1,154,192	1,324,763	1,524,293	3.3%
UNKNOWN	21,808	22,494	25,182	28,095	30,983	34,412	2.0%
CARCARRIER	478,211	526,485	644,548	776,356	921,614	1,097,614	3.7%
PRODUCT	192,241	212,719	256,060	299,979	342,372	391,651	3.1%
RORO	104,145	112,667	139,472	172,978	208,482	253,187	3.9%
OTHER	8,468	8,488	9,754	11,522	13,489	15,957	2.8%
Total	13,177,428	14,309,183	16,979,390	19,853,589	22,787,288	26,384,727	3.1%

Source: Sum of individual JoC shipments forecast at Global Insight growth rates by commodity and trade partner.

Table 3-8
Unadjusted Base Container and Non Container Tons by Vessel Type

Export Container Tons

VesselGroup	2001	2002	2005	2010	2015	2020	2025	CAGR01to25
BULK	1,157	1,166	1,337	1,784	2,339	3,012	3,900	5.4%
CARCARRIER	276	270	293	377	476	595	749	4.5%
CONTAINER	841,761	841,045	947,544	1,196,483	1,483,611	1,824,588	2,260,729	4.4%
GENERALCARGO	76,994	77,442	86,372	110,195	139,225	174,161	219,732	4.6%
OTHER	87	89	97	122	160	209	277	5.1%
RORO	11,947	10,807	11,491	14,930	19,139	24,322	31,109	4.7%
UNKNOWN	339	359	402	497	618	762	945	4.3%
	932,560	931,179	1,047,536	1,324,389	1,645,568	2,027,650	2,517,441	4.4%

Export NonContainer Tons

VesselGroup	2001	2002	2005	2010	2015	2020	2025	CAGR01to25
BULK	79,723	82,831	81,043	85,023	89,814	94,097	98,741	0.8%
CARCARRIER	212,605	216,521	257,890	332,035	410,303	500,776	611,980	4.6%
CONTAINER	7,160	6,574	6,760	7,985	9,445	11,195	13,411	3.1%
GENERALCARGO	412,607	385,012	375,327	392,524	410,833	426,035	443,116	0.6%
OTHER	5,012	3,090	3,168	3,831	4,541	5,344	6,359	3.2%
PRODUCT	1,192	1,128	1,070	1,106	1,135	1,151	1,167	0.1%
RORO	6,512	6,544	7,354	8,987	10,897	13,239	16,269	4.0%
TANKER	75,706	91,271	96,083	106,206	117,706	129,306	142,556	2.0%
UNKNOWN	10,055	9,354	9,042	9,706	10,461	11,177	11,981	1.1%
	810,572	802,325	837,736	947,403	1,065,134	1,192,321	1,345,580	2.3%

Import Container Tons

VesselGroup	2001	2002	2005	2010	2015	2020	2025	CAGR02to25
BULK		9,394	11,833	19,876	33,031	53,190	86,726	10.1%
CARCARRIER		1,938	2,204	2,908	3,768	4,700	5,886	4.9%
CONTAINER		2,146,548	2,369,442	3,049,307	3,821,815	4,655,848	5,719,874	4.4%
GENERALCARGO		130,518	146,194	191,360	241,991	297,339	368,182	4.6%
OTHER		797	882	1,173	1,563	2,055	2,735	5.5%
RORO		21,581	24,045	31,085	40,248	48,690	59,453	4.5%
UNKNOWN		2,581	2,894	3,752	4,795	5,970	7,467	4.7%
		2,313,357	2,557,493	3,299,461	4,147,213	5,067,791	6,250,323	4.4%

Import NonContainer Tons

VesselGroup	2001	2002	2005	2010	2015	2020	2025	CAGR02to25
BULK		6,678,935	7,241,767	8,313,718	9,383,242	10,374,364	11,528,882	2.4%
CARCARRIER		259,481	266,098	309,228	361,808	415,542	478,999	2.7%
CONTAINER		72,341	80,674	97,643	114,895	130,898	149,377	3.2%
GENERALCARGO		1,214,647	1,273,835	1,462,544	1,680,227	1,900,859	2,174,942	2.6%
OTHER		4,492	4,341	4,628	5,259	5,880	6,585	1.7%
PRODUCT		191,112	211,649	254,953	298,844	341,221	390,484	3.2%
RORO		65,213	69,777	84,470	102,693	122,231	146,356	3.6%
TANKER		634,831	708,119	869,726	1,036,486	1,195,457	1,381,738	3.4%
UNKNOWN		9,514	10,157	11,227	12,220	13,074	14,020	1.7%
		9,130,567	9,866,417	11,408,137	12,995,674	14,499,527	16,271,384	2.5%

	2002	2005	2010	2015	2020	2025	CAGR02to25
Total Container	3,244,536	3,605,029	4,623,850	5,792,781	7,095,441	8,767,763	4.4%
Total NonContainer	9,932,892	10,704,153	12,355,540	14,060,808	15,691,847	17,616,964	2.5%
Total	13,177,428	14,309,183	16,979,390	19,853,589	22,787,288	26,384,727	3.1%

Source: Sum of individual JoC shipments forecast at Global Insight growth rates by commodity and trade partner.

3.2 Calibration and Analysis

This section includes the analysis of current port data and current statistics utilized to calibrate the unadjusted base data prior to the development of the adjusted forecasts in Section 3.3.

The analysis includes Port of Veracruz historical data and trends and the calibration of the base data with the reported port data. Also included are a range of analyses that impact the forecast including: previous port forecasts, via port analyses, noncontainer commodity forecasts, May 2003 Mexico port shares, long term TEU forecasts, Port of Veracruz 2003 data, container carrier analysis and shipper/consignee detail for major commodities.

Veracruz Port Historical Statistics

The following table shows the historical cargo reported by the Port of Veracruz. As shown in Table 3-9, tonnage through the Port of Veracruz has increased at 11.6% per year between 1990 and 2002. The growth rate for the 4 year period 1998 to 2002 was about half that level (5.9%) with exports declining and imports increasing at 8.1%. During the same periods, container growth was 15.8% (1990 to 2002) and 7.5% per year (1998 to 2002); agricultural commodities were 12.9% and 6.1%; minerals were 13.4% and 6.3% and autos were 24.8% and 23.4%.

The early portion of the historical period was in part stimulated by the initial implementation of NAFTA, especially for grain imports, and the most recent period has been subdued by economic slowdowns in Mexico and its trading partners. Overall the historical growth demonstrates the strong position of Veracruz, and as preliminarily shown in Tables 3-2A, 3-2B and 3-2C, the Port of Veracruz has continued to show relatively strong performance in the 2000 to 2003 period.

The European Union-Mexico Free Trade Agreement was implemented in 2001, following the 1994 implementation of NAFTA with the United States and Canada. There are also current and potential free trade agreements with a number of Central and South American countries, and Mexico has been negotiating an FTA with Japan since 2002. The European and Latin American free trade agreements, in particular, will contribute to higher growth of trade through the Port of Veracruz.

Table 3-9
Veracruz Port History
Source: Port of Veracruz

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	CAGR90to02	CAGR98to02
BUQUES	699	741	938	1,035	1,245	1,123	1,346	1,451	1,809	1,633	1,676	1,689	1,623	7.3%	-2.7%
. TERMINALES	699	741	938	1,004	1,229	1,116	1,340	1,438	1,795	1,631	1,675	1,686	1,620	7.3%	-2.5%
. **CABOTAJE**		-	-	**31**	**16**	**7**	**6**	**13**	**14**	**2**	1	3	3		
. CRUCEROS										1	14	4	2		
. **PASAJEROS**										**860**	**12939**	**4497**	**3109**		
CARGA															
. IMPORTACION	3,489,200	3,307,345	4,251,680	4,812,055	5,542,926	4,400,700	7,086,000	7,177,631	9,569,235	10,538,292	11,882,239	12,274,932	13,070,641	11.6%	8.1%
. EXPORTACION	713,500	915,933	933,200	1,106,700	1,337,257	2,077,760	2,402,823	2,523,007	2,777,559	2,642,892	2,933,688	2,846,426	2,663,937	11.6%	-1.0%
CABOTAJE	21,700	0	0	46,800	4,300	2,200	57,317	245,346	158,326	541	461	41,994	21,254	-0.2%	-39.5%
TOTAL	**4,224,400**	**4,223,278**	**5,184,880**	**5,965,555**	**6,884,483**	**6,480,660**	**9,546,140**	**9,945,984**	**12,505,120**	**13,181,726**	**14,816,388**	**15,163,353**	**15,755,832**	**11.6%**	**5.9%**
GENERAL	**977,300**	**808,242**	**957,120**	**979,600**	**1,241,800**	**1,164,093**	**1,358,766**	**1,468,803**	**1,728,683**	**1,445,977**	**1,974,509**	**1,957,450**	**2,122,595**	**6.7%**	5.3%
. IMPO	648,100	544,548	717,480	850,500	838,800	376,199	384,532	524,027	882,223	789,462	1,252,758	1,164,402	1,285,624	5.9%	9.9%
. EXPO	329,200	263,694	239,640	329,100	403,000	787,894	974,234	943,470	842,286	533,011	721,289	794,055	835,759	8.1%	-0.2%
CONTENERIZADA	**862,000**	**1,276,782**	**1,777,300**	**1,987,200**	**2,454,800**	**2,193,827**	**2,506,354**	**3,232,344**	**3,774,204**	**4,391,097**	**5,074,769**	**4,956,866**	**5,037,663**	**15.8%**	7.5%
. IMPO	612,000	755,510	1,180,700	1,321,500	1,643,300	1,168,401	1,461,076	1,977,663	2,375,419	2,608,422	2,978,580	3,039,472	3,313,225	15.1%	8.7%
. EXPO	250,000	521,272	596,600	665,700	811,500	1,025,426	1,045,278	1,254,681	1,398,784	1,782,679	2,096,189	1,917,394	1,724,439	17.5%	5.4%
G. MINERAL	**401,600**	**322,593**	**362,500**	**429,200**	**414,000**	**329,100**	**703,291**	**1,172,737**	**1,429,870**	**1,066,164**	**1,336,390**	**1,673,327**	**1,822,655**	**13.4%**	6.3%
. IMPO	342,800	322,593	362,500	421,300	411,500	329,100	664,627	979,634	1,183,748	1,023,826	1,336,390	1,672,319	1,822,655	14.9%	11.4%
. EXPO	58,800	0	0	7,900	2,500	0	38,664	130,736	246,123	65,300	0	0	0	-100.0%	-100.0%
G. AGRICOLA	**1,387,400**	**1,109,316**	**1,483,940**	**1,880,355**	**2,050,300**	**1,971,000**	**3,994,301**	**3,315,448**	**4,676,320**	**5,391,630**	**5,551,386**	**5,868,369**	**5,919,648**	**12.9%**	6.1%
. IMPO	1,382,900	1,101,586	1,477,100	1,865,455	2,050,300	1,971,000	3,966,196	3,084,735	4,431,422	5,374,188	5,551,386	5,792,950	5,883,046	12.8%	7.3%
. EXPO	4,500	7,730	6,840	14,900	0	0	28,105	49,037	92,645	17,442	0	33,424	16,560	11.5%	-35.0%
FLUIDOS	**574,400**	**705,345**	**604,020**	**642,400**	**719,300**	**820,440**	**926,071**	**756,655**	**896,043**	**886,859**	**879,335**	**707,342**	**853,271**	**3.4%**	-1.2%
. IMPO	503,400	583,108	513,900	553,300	599,000	556,000	609,529	611,572	696,422	742,394	763,125	605,789	766,091	3.6%	2.4%
. EXPO	71,000	123,237	90,120	89,100	120,300	264,440	316,542	145,083	197,721	144,460	116,210	101,553	87,179	1.7%	-18.5%
TOTAL	**4,202,700**	**4,223,278**	**5,184,880**	**5,965,555**	**6,884,483**	**6,480,660**	**9,546,140**	**9,945,984**	**12,505,120**	**13,181,726**	**14,816,389**	**15,163,354**	**15,755,832**	**11.6%**	5.9%
. IMPO	3,489,200	3,307,345	4,251,680	4,812,055	5,542,900	4,400,700	7,085,960	7,177,631	9,569,235	10,538,292	11,882,239	12,274,932	13,070,641	11.6%	8.1%
. EXPO	713,500	915,933	933,200	1,106,700	1,337,300	2,077,760	2,402,823	2,523,007	2,777,559	2,642,892	2,933,688	2,846,426	2,663,937	11.6%	-1.0%
AUTOMOVILES															
IMPORTACION														**CAGR97to02**	
. No. UNIDADES						1,000	1,198	6,180	47,360	84,822	133,793	165,956	226,401	105.5%	47.9%
. PESO (TNS.)		-	-	-	2,100	1,200	719	7,484	59,008	116,374	152,644	200,094	272,866	105.3%	46.6%
EXPORTACION														**CAGR95to02**	
. No. UNIDADES			25,035	29,095	40,131	87,449	106,721	109,665	132,637	162,851	168,167	188,363	191,133	11.8%	9.6%
. PESO (TNS.)		9,700	26,600	30,300	47,100	98,900	119,900	135,914	160,816	200,357	210,877	242,686	282,593	16.2%	15.1%
TOTAL (TNS)		**9,700**	**26,600**	**30,300**	**49,200**	**100,100**	**120,619**	**143,398**	**219,824**	**316,731**	**363,521**	**442,780**	**555,459**	**27.7%**	26.1%
TOTAL (UNIDADES)		-	**25,035**	**29,095**	**40,131**	**88,449**	**107,919**	**115,845**	**179,997**	**247,673**	**301,960**	**354,319**	**417,534**	**24.8%**	23.4%

3.2.1 Tons Per TEU and Calibration

The container tonnages reported by the Port of Veracruz include both the tare weight of the containers and the weight of empty containers. The tare weight of containers and empty containers are not included in the JoC data. Therefore it is necessary to adjust the JoC data to include tare weights and empty containers in order to be comparable with the Port of Veracruz statistics.

The following analyses address the calculation of adjustments to the container cargo to align with the reported port data (Table 3-10A).

The second part of the following table (Table 3-10B) calculates the ratio of total container tons and container cargo tons in the Port of Veracruz.

For imports, total container tons were 22% higher in 2002 than the cargo tons primarily due to the tare weight of the containers. For exports the total container tons were 50% higher than the container cargo tons due to the significant number of empty containers in addition to the tare weight.

Table 3-10A analyzes the tons per TEU reported in the JoC data for May 2003 and compares the estimated TEUs identified in the JoC data with the reported TEUs for the Port of Veracruz. As shown the Port of Veracruz TEUs, which include empties, are substantially higher than the JoC TEUs, especially in the export direction.

Table 3-10 B calculates the ratio of total tons, including tare and empty container weights, to cargo tons reported in the Port of Veracruz data for 2002.

Table 3-11A compares the container and non container tons reported by the Port of Veracruz with the JoC tonnages. As shown, due to the container tare and empty weights, the difference is substantial for container tonnage. However, there is also a difference for non container tons which is in part associated with vessel calls not included in the JoC data.

Table 3-11B shows the historical trend in the ratio of container tare and empty weights with container cargo reported in the port, which indicate the most recent values are representative of recent historical levels.

Container Tare and Empty Weight Adjustment

Part 1
Table 3-10A
Analysis of JoC Tons Per TEU

May-03	Tons	TEUS	Tons/TEU
Import	570,206	61,356	9.293468
Export	307,460	27,706	11.09706

Estimated JoC TEUs

2002	Tons	TEUs
Import	2,313,357	248,923
Export	931,179	83,912

Port Reported Import TEUS	278,091	(includes empties)
Port Reported Export TEUS	270,331	(includes empties)

The above analysis compares the estimated TEUs from the JoC database with the Port reported TEUs. The reported TEUs include empties which results in a more balanced level of exports and imports compared with the JoC estimate of loaded containers. The analysis is also consistent with missing voyages and some imports of empties.

Part 2
Table 3-10B
2002 Ratio of Tare Weight and Empties to Cargo

ContainerTons	2,721,428
Tare Weight	560,979
Empty Containers	30,818
Total Container Imports	3,313,225
Total Tons to Cargo Tons	1.22

ContainerTons	1,149,316
Tare Weight	241,702
Empty Containers	333,421
Total Container Exports	1,724,439
Total Tons to Cargo Tons	1.50

Source: Port of Veracruz

The above table calculates the ratio of container tare weights and empties to loaded container cargo by direction from the Port data. A time series of this calculation is included in the following table.

Table 3-11A
JoC versus Port of Veracruz Comparison

	JoC 2002	Port 2002	Difference	
Container	3,244,536	5,037,663	1,793,127	64.4%
NonContainer	9,932,892	10,718,169	785,277	92.7%
Total	13,177,428	15,755,832	2,578,404	83.6%

The above table compares the reported JoC container and non container tons with the Port of Veracruz reported data. As shown, the JoC reported container tons are significantly below the port reported tons due to the tare weights and empty container weight. A smaller difference occurs for non container cargo due to vessel calls not included in the JoC database. The following tables include the factors required to adjust for these differences.

Table 3-11B
Historical Trend in Ratio of Tare and Empty to Container Cargo

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Cargo	979,040	1,105,500	1,367,600	929,801	1,167,361	1,584,869	1,912,439	2,093,985	2,404,812	2,471,138	2,721,428
Tare	193,940	212,000	265,100	189,200	235,264	312,290	387,275	458,023	523,870	524,055	560,979
Empty	7,720	4,000	10,600	49,400	58,451	80,504	75,705	56,414	49,898	44,279	30,818
TOTAL IMPORT	1,180,700	1,321,500	1,643,300	1,168,401	1,461,076	1,977,663	2,375,419	2,608,422	2,978,580	3,039,472	3,313,225
	1.21	1.20	1.20	1.26	1.25	1.25	1.24	1.25	1.24	1.23	1.22
Cargo	415,800	468,000	545,800	784,726	768,144	870,530	951,443	1,266,716	1,520,988	1,329,556	1,149,316
Tare	77,400	84,300	101,400	155,000	174,151	227,630	249,653	290,786	310,586	281,172	241,702
Empty	103,400	113,400	164,300	85,700	102,983	156,521	197,688	225,177	264,615	306,666	333,421
Total Export	596,600	665,700	811,500	1,025,426	1,045,278	1,254,681	1,398,784	1,782,679	2,096,189	1,917,394	1,724,439
	1.43	1.42	1.49	1.31	1.36	1.44	1.47	1.41	1.38	1.44	1.50

Source: Port of Veracruz

This table provides the time series calculation of the ratio of container tare weight and empty container weight with container cargo tons. The 2002 levels are 1.50 for exports and 1.22 for imports. Over the reported period, the import ratio ranged from 1.31 to 1.50 and the export ratio ranged from 1.20 to 1.25.

3.2.2 Previous Port Forecast

The following Table 3-12 displays the previous forecast for the Port of Veracruz. The source of the previous forecast is the Development Plan for Port of Veracruz, Prepared for APIVER by INOPESA, 2000.

The previous low forecast for the year 2025 was 39.1 million tons, the probable forecast was 61.6 million tons and the optimistic forecast was 101.5 million tons.

The largest commodities are container and bulk grain. The compound annual growth rates between 2002 and 2025 for the container forecast ranged from pessimistic (3.2%) to probable (5.9%) to optimistic (9.4%). Bulk grain was forecast to grow from pessimistic (5.1%) to probable (6.9%) and optimistic (7.8%). Bulk minerals were forecast below the growth of grains at pessimistic (3.5%) to probable (3.4%) and optimistic (6.8%).

In comparison to the previous forecast the unadjusted base forecast generates growth rates for container at 4.3% which falls between the pessimistic and probable previous forecast. The bulk carrier base forecast is only 2.4%, which is half of the bulk grain pessimistic forecast. Shipper interviews were conducted to identify and factors that support higher growth of imported grain such as the impact of NAFTA continuing to open up Mexico's markets to US and Canadian grain and increased cost competitiveness of the Port with the ability to handle larger vessels. The recent EU-Mexico and other multilateral and bilateral FTA's are also likely to be significant with respect to the growth of containerized cargo and the exports and imports of automobiles and parts. Based on these analyses, the probable and optimistic forecast show higher rates of growth.

Table 3-12
Previous Port of Veracruz Forecast
Source: Port of Veracruz

Pessimistic

	2001	2005	2010	2015	2020	2025	CAGR01to25
General Cargo	2,095	1,759	1,414	1,676	1,986	2,353	0.5%
Container	5,176	5,754	6,568	7,781	9,220	10,924	3.2%
Bulk Grain	6,367	8,658	12,716	15,066	17,851	21,150	5.1%
Bulk Mineral	1,568	1,810	2,168	2,565	3,040	3,601	3.5%
Fluids	578	608	649	769	912	1,080	2.6%
Total	15,784	18,589	23,515	27,857	33,009	39,108	3.9%

Probable

	2001	2005	2010	2015	2020	2025	CAGR01to25
General Cargo	2,095	2,242	2,440	3,089	3,911	4,951	3.6%
Container	5,176	6,959	10,075	12,755	16,147	20,442	5.9%
Bulk Grain	6,367	9,452	15,488	19,608	24,823	31,426	6.9%
Bulk Mineral	1,568	1,640	1,735	2,197	2,781	3,521	3.4%
Fluids	578	603	637	806	1,020	1,292	3.4%
Total	15,784	20,896	30,375	38,455	48,682	61,632	5.8%

Optimistic

	2001	2005	2010	2015	2020	2025	CAGR01to25
General Cargo	2,095	2,397	2,836	3,960	5,528	7,716	5.6%
Container	5,176	8,679	16,557	23,114	32,267	45,045	9.4%
Bulk Grain	6,367	9,119	14,287	19,945	27,844	38,870	7.8%
Bulk Mineral	1,568	2,031	2,805	3,916	5,466	7,631	6.8%
Fluids	578	676	822	1,147	1,601	2,236	5.8%
Total	15,784	22,902	37,307	52,082	72,706	101,498	8.1%

Source: Development Plan for Port of Veracruz, Prepared for APIVER by INOPESA, 2000
(Note: Does not include automobiles)

3.2.3 Via Port Analysis

Via ports are the next or previous port at which containers are loaded or unloaded and may be different from the port and country of ultimate origin or destination. The JoC data provided information on the via ports which were compared with the ultimate ports and countries to assess the level of actual and potential transshipment at hub ports linked to the Port of Veracruz.

The following Tables 3-13 and 3-14 display the reported TEUs by via port for imports and exports, respectively. Tables 3-13 and 3-14 were developed to identify the first and last ports at which Port of Veracruz TEUs were handled. Additional analysis of the underlying data was undertaken to compare the country of final destination and origin with the first and last ports of handling.

Analysis of the via port data indicates that the most significant container movements are imported from Europe and East Coast of Latin America (Antwerp, Bremerhaven, Santos, Le Havre, Barcelona, Buenos Aires, Valencia). The largest import via ports also include Houston and Kingston. Container exports also are carried to Caribbean ports such as Puerto Cabello, Punta Manzani, Freeport, Havana, Puerto Limon, Miami and Cartagena.

While some of the cargo is transshipped at ports such as Puerto Cabello, Houston, Freeport and Cartagena, most of the cargo carried to and from these ports were found to be for local origins and destinations.

This analysis was initiated to explore the use of other ports as major hubs for Veracruz traffic which potentially link Veracruz with other major markets such as Far East containers. As noted, the analysis identified some volumes of containers transshipped at via ports or way ports. However, the vast majority of the containers to and from these ports are local containers. The services linking Veracruz to way ports such as Cartagena, Freeport, etc. are mostly regional container services and not feeders for the hubs. Analysis of the container movements showed less than 5% of Port of Veracruz TEUs were potentially transshipped at regional hub ports.

While the bulk of services to the Port of Veracruz are linehaul vessels, changes in services continue to occur. For example, it was reported in the interviews that MSC had introduced a feeder service linked to Freeport with larger containerships. A review of recent services for MSC indicated that MSC has more recently used smaller feeder vessels but future services are shifting back to line haul vessels from the Mediterranean, which will also likely handle containers from other MSC services calling Freeport. As a result, the Port of Veracruz will continue to be served primarily by line haul vessels but small volumes of transshipments may be included in the services of carriers in the Port.

Table 3-13
Import Via Port TEUs - 2000 to 2002

VIAPORT	SumOfCONQTY	TEUs	Percent	Cumulative Percentage
AMBERES	34,874	51,513	22.6%	22.6%
BREMERHAVEN	26,559	42,315	18.6%	41.2%
SANTOS	8,566	13,965	6.1%	47.4%
LE HAVRE	8,147	13,326	5.9%	53.2%
BARCELONA SP	5,293	8,269	3.6%	56.9%
HOUSTON	4,457	7,118	3.1%	60.0%
BUENOS AIR AG	4,220	7,097	3.1%	63.1%
VALENCIA SP	4,817	6,040	2.7%	65.8%
KINGSTON JA	4,287	5,991	2.6%	68.4%
FELIXSTOWE	3,338	5,791	2.5%	71.0%
FREEPORT BH	3,886	5,710	2.5%	73.5%
HAMBURGO	3,552	5,641	2.5%	75.9%
LA SPEZIA	3,154	5,115	2.2%	78.2%
GENOVA	2,583	4,238	1.9%	80.1%
JACKSONVILLE	1,843	3,601	1.6%	81.6%
THAMESPORT	2,103	3,470	1.5%	83.2%
LA HABANA	2,501	3,450	1.5%	84.7%
CARTAGENA CL	2,158	3,346	1.5%	86.1%
PTO CABELLO	1,870	3,176	1.4%	87.5%
LIVORNO	1,429	2,156	0.9%	88.5%
CHARLESTON SC	1,495	2,139	0.9%	89.4%
BILBAO	1,466	2,112	0.9%	90.4%
ITAJAI	1,049	1,553	0.7%	91.0%
PUERTO LIMON	776	1,405	0.6%	91.7%
MONTEVIDEO	674	1,308	0.6%	92.2%
NEW YORK	698	1,265	0.6%	92.8%
RIO GRANDE BR	781	1,251	0.5%	93.3%
RIO D JANEIRO	944	1,183	0.5%	93.9%
ROTTERDAM	631	1,078	0.5%	94.3%
RIO HAINA	742	1,066	0.5%	94.8%
GIOIA TAURO	679	1,039	0.5%	95.3%
MIAMI	551	947	0.4%	95.7%
ALGECIRAS	427	644	0.3%	96.0%
GUANTA	517	521	0.2%	96.2%
PUNTA MANZANI	271	462	0.2%	96.4%
PT EVERGLADES	283	436	0.2%	96.6%
HALIFAX NS	296	392	0.2%	96.8%
BARRANQUILLA	216	340	0.1%	96.9%
VITORIA BR	292	339	0.1%	97.0%
SAN JUAN PR	197	296	0.1%	97.2%
DUBLIN	275	291	0.1%	97.3%
HAIFA	240	284	0.1%	97.4%
LA GUAIRA	183	254	0.1%	97.5%
JAWAHARLAL NE	205	251	0.1%	97.7%
KARACHI	139	239	0.1%	97.8%
GUAYAQUIL	125	228	0.1%	97.9%
Subtotal	143,777	222,645		
Other	3,232	4,871		
Total	147,009	227,516		

Table 3-14
Export Via Port TEUs - 2000 to 2002

VIAPORT	SumOfCONQTY	TEUs	Percent	Cumulative Percentage
PTO CABELLO	4,561	8,042	8.8%	8.8%
BREMERHAVEN	4,951	7,836	8.5%	17.3%
AMBERES	4,992	7,781	8.5%	25.8%
PUNTA MANZANI	3,941	6,521	7.1%	32.9%
FREEPORT BH	3,828	6,436	7.0%	39.9%
LA HABANA	3,574	5,942	6.5%	46.4%
PUERTO LIMON	2,313	4,023	4.4%	50.8%
MIAMI	2,119	3,431	3.7%	54.5%
CARTAGENA CL	2,210	3,265	3.6%	58.1%
PT EVERGLADES	1,553	2,600	2.8%	60.9%
BARCELONA SP	2,326	2,598	2.8%	63.7%
RIO HAINA	1,338	2,285	2.5%	66.2%
HOUSTON	1,495	2,212	2.4%	68.6%
JACKSONVILLE	1,213	2,184	2.4%	71.0%
BUENOS AIR AG	1,452	2,126	2.3%	73.3%
KINGSTON JA	1,334	2,030	2.2%	75.5%
NEW ORLEANS	1,926	2,011	2.2%	77.7%
SANTOS	1,406	1,990	2.2%	79.9%
LA GUAIRA	1,201	1,791	2.0%	81.8%
THAMESPORT	1,056	1,747	1.9%	83.7%
SAN JUAN PR	908	1,576	1.7%	85.5%
HAMBURGO	633	1,145	1.2%	86.7%
CHARLESTON SC	758	1,062	1.2%	87.9%
LE HAVRE	564	824	0.9%	88.8%
PORT OF SPAIN	494	788	0.9%	89.6%
KOTKA	335	664	0.7%	90.3%
VALENCIA SP	428	628	0.7%	91.0%
LA SPEZIA	459	612	0.7%	91.7%
NEW YORK	485	574	0.6%	92.3%
VALPARAISO	445	568	0.6%	92.9%
FORTALEZA	538	561	0.6%	93.5%
ALGIERS	533	535	0.6%	94.1%
FELIXSTOWE	333	535	0.6%	94.7%
SN ANTONIO CH	425	490	0.5%	95.2%
CALLAO	244	321	0.3%	95.6%
GIOIA TAURO	228	305	0.3%	95.9%
BILBAO	150	257	0.3%	96.2%
VITORIA BR	154	249	0.3%	96.5%
PT AU PRINCE	173	239	0.3%	96.7%
BARRANQUILLA	153	213	0.2%	97.0%
RIO D JANEIRO	147	198	0.2%	97.2%
ROTTERDAM	123	156	0.2%	97.4%
ITAJAI	102	152	0.2%	97.5%
ARICA	135	148	0.2%	97.7%
PARANAGUA	84	137	0.1%	97.8%
GENOVA	80	109	0.1%	97.9%
Subtotal	57,891	89,889		
Other	1,367	1,883		
Total	59,258	91,772		

3.2.4 Base Non Container Commodity Forecasts

The following two tables summarize the unadjusted base forecasts of non container cargo by commodity for the Port of Veracruz based on the Global Insight long term forecasts. Table 3-15 shows imports and Table 3-16 shows exports.

As shown in Table 3-15, the unadjusted base long term grain import forecast is 1.7% per year between 2002 and 2025 while oilseeds are projected to grow at 4.6%. The growth rates for the next largest commodities are iron and steel (1.0%), fertilizer (0.5%) and scrap (1.6%). For exports, Table 3-16 shows the growth rates for the largest commodities are iron and steel (0.3%), motor vehicles (4.6%) and sugar (1.7%).

Grain and oilseeds represent approximately 56% of the non container imports over the forecast period. The average growth rate for the unadjusted forecasts of grain and oilseeds is 2.5%, which is similar to the unadjusted total non container import growth rate resulting in the level share of non container imports. The base growth rate is also similar to the Port of Veracruz reported 2003 growth of 2.37% and the four year average growth rate between 1999 and 2003 of 2.56%.

In subsequent sections, the Mexico shippers and consignees of key commodities are identified from the May 2003 JoC data to support the conduct of interviews of the major shippers and consignees associated with significant commodities

Table 3-15
Unadjusted Base Veracruz Import Non Container Commodity Forecasts

Commodity Code	Commodity Group	2002	2005	2010	2015	2020	2025	CAGR02to25*
C1A	Grain	4,053,132	4,401,498	4,889,845	5,312,289	5,647,353	6,003,557	1.7%
C3529	Oil Seeds	1,102,887	1,278,084	1,665,129	2,096,757	2,539,364	3,077,408	4.6%
C371	Iron and Steel	709,827	687,099	736,031	795,980	845,027	898,257	1.0%
C3512	Fertilizers and Pesticides	581,834	587,125	611,262	628,363	638,171	648,395	0.5%
C2G	Scrap	422,548	423,494	469,274	520,721	565,502	614,258	1.6%
C311E	Animal and Vegetable Oils	406,760	455,595	549,100	640,429	727,235	825,896	3.1%
C3511A	Organic Chemicals	231,961	260,164	327,123	396,947	462,005	538,091	3.7%
C3843A	Motor Vehicles	231,686	235,169	269,484	310,359	352,940	401,974	2.4%
C354B	Residual Petroleum Pruducts	192,351	200,543	214,896	227,974	238,575	249,677	1.1%
C399	Misc.	185,155	203,787	271,342	351,444	437,762	545,693	4.8%
C311F	Other Food	178,353	202,361	251,858	302,394	351,377	408,348	3.7%
C372	Non-Ferrous Metals	166,942	193,551	238,071	292,817	349,608	419,646	4.1%
C3511B	Inorganic Chemicals	115,983	133,773	167,982	200,189	231,632	268,384	3.7%
C2C	Ores	68,825	68,825	68,825	68,825	68,825	68,825	0.0%
C381	Metal Products	64,848	71,157	90,172	112,317	135,896	165,009	4.1%
C331	Wood Products	51,630	59,253	77,478	99,391	124,712	158,517	5.0%
C311D	Animal Feed	48,509	52,999	64,146	74,800	84,468	95,386	3.0%
C1E	Cork and Wood	43,909	42,734	46,292	51,424	56,673	62,519	1.5%
C353	Petroleum Refineries	40,655	43,099	46,727	49,739	51,926	54,212	1.3%
C3529	Chemical Products, nec.	36,258	40,498	51,044	62,166	72,355	84,430	3.7%
C2A	Stone, Clay and Other Crude Minerals	31,650	31,755	32,044	32,299	32,512	32,738	0.1%
C341C	Paper and Paperboard and Products	31,432	37,427	51,568	68,110	86,261	109,264	5.6%
C3831	Electrical Industrial Machinery	16,303	22,527	38,730	60,153	85,533	121,679	9.1%
C390	Other Manufacturing, nec.	16,286	18,171	22,813	27,574	32,505	38,325	3.8%
C332	Furniture and Fixtures	13,174	15,605	21,711	29,191	37,370	47,875	5.8%
C3824	Special Industrial Machinery	12,015	12,742	15,395	18,273	21,130	24,465	3.1%
C3825	Office and Computing Machinery	10,575	14,179	25,205	43,844	71,879	117,894	11.1%
C2D	Coal and Coke	10,261	10,261	10,261	10,261	10,261	10,261	0.0%
C1D	Vegetables and Fruits - non-Refrigerated	9,707	10,613	12,927	15,425	18,059	21,143	3.4%
C3513	Synthetic Resins	8,395	9,472	12,050	14,921	17,753	21,153	4.1%
C3839	Electrical Apparatus, nec.	7,945	10,056	16,037	24,257	34,568	49,267	8.3%
C3523	Soap and Cleaning Preparations	4,596	5,817	8,538	11,672	14,948	19,178	6.4%
C3829	Machinery and Equipment, nec.	4,262	4,793	6,349	8,171	10,135	12,582	4.8%
C311B	Other Meat/Dairy/Fish/Fruit/Vegetables	3,129	3,436	4,100	4,719	5,337	6,038	2.9%
C3843B	Parts of Motor Vehicles	2,634	2,951	3,934	5,179	6,505	8,178	5.0%
C362	Glass and Products	2,234	2,768	4,026	5,666	7,697	10,465	6.9%
C3833	Electrical Appliances and Houseware	1,844	2,141	3,008	4,188	5,665	7,671	6.4%
C3821	Engines and Turbines	1,677	2,113	3,220	4,719	6,603	9,244	7.7%
C341B	Pulp	1,553	1,584	1,704	1,824	1,932	2,047	1.2%
C1C	Vegetables, Fruits and Eggs - req Refrigeration	1,157	1,162	1,180	1,206	1,238	1,282	0.4%
C369	Non-Metallic Products, nec.	818	892	1,110	1,356	1,599	1,887	3.7%
C1F	Natural Rubber	802	781	805	824	839	855	0.3%
C323	Leather and Products	706	821	1,098	1,423	1,774	2,216	5.1%
C3849	Transport Equipment, nec.	535	541	611	685	759	843	2.0%
C3521	Paint, Varnishes and Lacquers	472	484	544	620	690	768	2.1%
C3851	Professional Equipment	378	471	701	998	1,363	1,862	7.2%
C3822	Agricultural Machinery	372	367	385	405	421	439	0.7%
C3823	Metal and Wood Working Machinery	359	357	396	436	471	508	1.5%
C355	Rubber Products	285	327	452	605	778	1,000	5.6%
C361	Pottery, China etc.	268	269	293	319	343	369	1.4%
C3841	Shipbuilding and Repairing	176	177	179	181	182	184	0.2%
C342	Printing and Publishing	165	166	195	235	274	319	2.9%
C356	Plastic Products, nec.	129	139	187	251	311	385	4.8%
C1I	Other Agriculture	94	103	123	137	148	161	2.3%
C2B	Crude Fertilizers	48	48	48	48	48	48	0.0%
C3832C	Other Communications Equipment	35	45	70	104	147	207	8.0%
C322	Wearing Apparel	16	20	28	38	51	70	6.5%
C313	Beverages	16	16	16	17	16	16	0.1%
C321	Textiles	8	9	10	12	13	14	2.3%
C2E	Crude Petroleum	4	4	4	4	4	4	0.0%
C3852	Photographic and Optical Goods	0	0	0	0	0	0	4.8%
		9,130,567	9,866,417	11,408,137	12,995,674	14,499,527	16,271,384	2.5%

* Compound Annual Growth Rate 2002 to 2025

Table 3-16
Unadjusted Base Veracruz Export Non Container Commodity Forecasts

WEFA77CODE Commodity Code	Commodity Group	2001	2002	2005	2010	2015	2020	2025	CAGR02to25*
C371	Iron and Steel	461,990	427,599	411,629	425,596	440,243	450,415	460,924	0.3%
C3843A	Motor Vehicles	215,369	219,293	261,076	335,232	413,150	503,004	613,020	4.6%
C311C	Sugar	94,134	118,150	123,826	135,861	148,935	161,358	174,850	1.7%
C399	Misc.	6,075	3,770	3,870	5,174	6,760	8,580	10,920	4.7%
C3821	Engines and Turbines	5,036	4,996	6,203	9,020	12,545	17,062	23,209	6.9%
C3529	Oil Seeds	4,746	4,923	5,346	6,017	6,893	7,803	8,834	2.6%
C3511A	Organic Chemicals	3,887	3,890	4,586	6,216	8,392	11,107	14,700	6.0%
C1B	Oil Seeds	3,237	3,235	3,236	3,237	3,237	3,238	3,238	0.0%
C3843B	Parts of Motor Vehicles	2,566	2,663	3,156	4,189	5,419	6,899	8,807	5.3%
C381	Metal Products	2,346	2,394	2,376	2,465	2,621	2,793	2,985	1.0%
C3511B	Inorganic Chemicals	2,315	2,450	2,454	2,298	2,196	2,094	1,996	-0.9%
C3521	Paint, Varnishes and Lacquers	2,137	2,223	2,423	2,707	3,054	3,400	3,785	2.3%
C390	Other Manufacturing, nec.	1,442	1,536	1,855	2,587	3,584	4,964	6,875	6.7%
C3849	Transport Equipment, nec.	879	863	914	1,072	1,261	1,500	1,788	3.2%
C3845	Aircraft	817	735	844	1,071	1,314	1,577	1,894	4.2%
C3512	Fertilizers and Pesticides	755	766	746	754	799	849	902	0.7%
C372	Non-Ferrous Metals	688	649	765	923	1,070	1,219	1,389	3.4%
C3829	Machinery and Equipment, nec.	509	515	546	655	804	984	1,208	3.8%
C313	Beverages	377	402	469	600	752	924	1,136	4.6%
C311F	Other Food	174	169	190	228	269	312	363	3.4%
C3523	Soap and Cleaning Preparations	170	164	181	217	263	310	366	3.6%
C2A	Stone, Clay and Other Crude Minerals	124	126	133	149	169	190	213	2.3%
C1E	Cork and Wood	90	90	93	102	115	128	143	2.0%
C3824	Special Industrial Machinery	89	93	101	125	153	187	229	4.0%
C3822	Agricultural Machinery	81	79	82	90	99	108	118	1.7%
C3513	Synthetic Resins	70	76	82	91	100	109	120	2.0%
C3522	Drugs and Medicines	47	52	62	83	114	155	210	6.3%
C3839	Electrical Apparatus, nec.	47	51	63	101	153	225	330	8.5%
C321	Textiles	38	38	42	52	62	73	86	3.6%
C355	Rubber Products	33	36	45	60	72	86	104	4.7%
C1C	Vegetables, Fruits and Eggs - req Refrigeration	31	32	39	55	77	104	141	6.6%
C342	Printing and Publishing	30	28	30	32	35	37	40	1.5%
C3825	Office and Computing Machinery	30	28	30	39	54	76	107	6.0%
C3529	Chemical Products, nec.	27	27	30	37	44	51	59	3.4%
C3831	Electrical Industrial Machinery	23	26	34	49	66	88	118	6.8%
C311B	Other Meat/Dairy/Fish/Fruit/Vegetables	23	22	23	25	26	27	29	1.2%
C1A	Grain	21	21	22	25	28	31	34	2.2%
C332	Furniture and Fixtures	21	23	28	40	55	73	98	6.6%
C3851	Professional Equipment	18	19	24	32	42	53	67	5.6%
C1I	Other Agriculture	16	12	14	17	19	22	24	3.2%
C3842	Railroad Equipment	14	14	14	14	14	14	14	0.0%
C3833	Electrical Appliances and Houseware	11	11	13	16	19	23	27	3.8%
C341C	Paper and Paperboard and Products	10	11	13	16	18	21	25	3.8%
C369	Non-Metallic Products, nec.	8	8	8	9	11	14	17	3.5%
C356	Plastic Products, nec.	7	6	6	7	8	10	12	3.4%
C1H	Other Raw Textile Materials	4	4	4	4	4	4	4	0.0%
C311E	Animal and Vegetable Oils	3	3	3	4	5	6	7	3.7%
C362	Glass and Products	3	3	3	3	4	4	4	1.9%
C3841	Shipbuilding and Repairing	2	2	2	2	2	2	2	0.0%
C322	Wearing Apparel	1	1	1	2	3	4	6	7.5%
C323	Leather and Products	1	1	1	2	2	3	4	6.1%
		810,572	802,325	837,736	947,403	1,065,134	1,192,321	1,345,580	2.3%

* Compound Annual Growth Rate 2002 to 2025

3.2.5 May 2003 Export Import Tons and TEUs By Port

Table 3-17, summarizes the May 2003 total tons and TEUs by port for all ports in Mexico based on JoC data. The Port of Veracruz ranks second in tons and in TEUs for total trade. For imports, the Port of Veracruz ranks second in tons behind Lazaro Cardenas and second behind Manzanillo for TEUs. In the export direction, the Port of Veracruz ranks third in tons behind Lazaro Cardenas and Manzanillo (Altamira is a close 4th) and Veracruz ranks third in TEUs behind Manzanillo and Altamira.

Tables 3-18 and 3-19 display TEUs by port and by trade partner to assess the competition between carriers and ports in each market.

Table 3-17
May 2003 Mexico Export/Import Tons and TEUs by Port

Import

DISCHARGE PORT	MetricTons	Share of Tons	Sum Of TEUS	TEUShare
ACAPULCO	153	0.0%	0	0.0%
ALTAMIRA	558,878	15.3%	8,879	14.5%
ENSENADA	0	0.0%	0	0.0%
LAZARO CARDEN	1,186,464	32.5%	0	0.0%
MANZANILLO	333,084	9.1%	26,852	43.8%
MAZATLAN	11,515	0.3%	156	0.3%
PROGRESO	168,443	4.6%	3,106	5.1%
SALINA CRUZ	62	0.0%	6	0.0%
TAMPICO	157,618	4.3%	250	0.4%
TUXPAN	76,405	2.1%	0	0.0%
VERACRUZ	1,152,462	31.6%	22,107	36.0%
Total	3,645,085	100.0%	61,356	100.0%

Export

DOMESTIC PORT	MetricTons	Share of Tons	Sum Of TEUS	TEUShare
ACAPULCO	912	0.1%	0	0.0%
ALTAMIRA	116,279	15.1%	8,500	30.7%
ENSENADA	376	0.0%	0	0.0%
LAZARO CARDEN	257,832	33.5%	0	0.0%
MANZANILLO	179,072	23.3%	8,308	30.0%
MAZATLAN	7,597	1.0%	355	1.3%
PROGRESO	18,802	2.4%	2,355	8.5%
SALINA CRUZ	464	0.1%	31	0.1%
TAMPICO	61,896	8.0%	360	1.3%
TUXPAN	0	0.0%	0	0.0%
VERACRUZ	126,173	16.4%	7,798	28.1%
Total	769,404	100.0%	27,706	100.0%

Total

DOMESTIC PORT	MetricTons	Share of Tons	Sum Of TEUS	TEUShare
ACAPULCO	1,065	0.0%	0	0.0%
ALTAMIRA	675,157	15.3%	17,379	19.5%
ENSENADA	376	0.0%	0	0.0%
LAZARO CARDEN	1,444,296	32.7%	0	0.0%
MANZANILLO	512,156	11.6%	35,159	39.5%
MAZATLAN	19,112	0.4%	511	0.6%
PROGRESO	187,245	4.2%	5,461	6.1%
SALINA CRUZ	526	0.0%	37	0.0%
TAMPICO	219,514	5.0%	610	0.7%
TUXPAN	76,405	1.7%	0	0.0%
VERACRUZ	1,278,635	29.0%	29,905	33.6%
Total	4,414,489	100.0%	89,062	100.0%

3.2.6 May 2003 Aggregate TEUs by Port and Partner Region

Tables 3-18 and 3-19 summarize the May 2003 import and export TEUs by port and partner region.

As shown in the tables, the Port of Veracruz was the second largest port in the dominant import direction with 22,893 TEUs compared with 27,602 TEUs for the Port of Manzanillo. Significantly, 75% of Manzanillo TEUs are imported from Asia compared with 0.4% of TEUs from Europe. For the Port of Veracruz, Europe represents 65.3% of import TEUs and Asia only 1.5%.

In the export direction, the Port of Veracruz ranked third with 7,854 TEUs compared with 10,436 for the Port of Manzanillo and 8,514 TEUs for the Port of Altamira. Of the Port of Veracruz export TEUs, Europe represented 36.1% and Asia 0.9%. Exports to North America represented 39.9% and South American 21.9% of Port of Veracruz TEUs.

The data in this table indicates that the competition between east and west coast Mexican ports is relatively minimal with Manzanillo focusing on Asia and Veracruz/Altamira focusing on Europe and North and South America. In the dominant import direction, 97.9% of imports from Asia are moved through Manzanillo and 98.7% of imports from Europe are moved through Veracruz and Altamira. For exports, the comparable shares are 95.2% and 91.4%.

Due to the strong performance of Altamira, especially in the export direction, and combined with the similar trade partners for Veracruz and Altamira, an analysis of the carriers and trade partners for these ports was made. It indicated similar carriers and vessels calling both ports which suggest those vessels and carriers are utilizing Veracruz as the first port of call for imports and Altamira as the last port of call for exports, resulting in the higher export share for Altamira. However, the Altamira export and import TEUs are relatively balanced and more focused on northern Mexico origins, which lowers the potential for carriers to shift from the first import call at the Port of Veracruz. This is confirmed by the shipper and carrier interviews which do not indicate any significant danger of carrier shifts from the Port of Veracruz to the Port of Altamira. In addition, the shipper interviews indicated the routing of containers via rail from the Port of Houston is not considered a significant danger for the Port of Veracruz.

Table 3-18
May 2003 TEU Mexico Imports by Port and Region

Import TEUs by Port-Region

DISCHARGE PORT	REGION	SumOfTEUS	%of Total
ALTAMIRA	1-North America	390	4.3%
ALTAMIRA	2-South America	3,275	36.5%
ALTAMIRA	3-Europe	4,908	54.7%
ALTAMIRA	4-Africa-MidEast	340	3.8%
ALTAMIRA	5-Asia	63	0.7%
ALTAMIRA	6-AustraliaNZ	2	0.0%
		8,977	100.0%
MANZANILLO	1-North America	1,672	6.1%
MANZANILLO	2-South America	4,031	14.6%
MANZANILLO	3-Europe	109	0.4%
MANZANILLO	4-Africa-MidEast	26	0.1%
MANZANILLO	5-Asia	20,699	75.0%
MANZANILLO	6-AustraliaNZ	1,062	3.8%
MANZANILLO	7-Other Region	3	0.0%
		27,602	100.0%
MAZATLAN	1-North America	73	36.9%
MAZATLAN	2-South America	124	62.6%
MAZATLAN	3-Europe	1	0.5%
MAZATLAN	5-Asia	0	0.0%
		198	100.0%
PROGRESO	1-North America	2,889	93.0%
PROGRESO	2-South America	118	3.8%
PROGRESO	3-Europe	68	2.2%
PROGRESO	4-Africa-MidEast	4	0.1%
PROGRESO	5-Asia	27	0.9%
		3,106	100.0%
SALINA CRUZ	1-North America	6	100.0%
		6	100.0%
TAMPICO	1-North America	54	21.6%
TAMPICO	2-South America	42	16.8%
TAMPICO	3-Europe	96	38.4%
TAMPICO	4-Africa-MidEast	51	20.4%
TAMPICO	5-Asia	7	2.8%
		250	100.0%
VERACRUZ	1-North America	2,414	10.5%
VERACRUZ	2-South America	4,520	19.7%
VERACRUZ	3-Europe	14,943	65.3%
VERACRUZ	4-Africa-MidEast	658	2.9%
VERACRUZ	5-Asia	351	1.5%
VERACRUZ	6-AustraliaNZ	7	0.0%
		22,892	100.0%

Table 3-19
May 2003 TEU Mexico Exports by Port and Region

Export TEUs by Port Region

LOAD PORT	REGION	SumOfTEUS	%of Total
ALTAMIRA	1-North America	2,288	26.9%
ALTAMIRA	2-South America	2,528	29.7%
ALTAMIRA	3-Europe	3,456	40.6%
ALTAMIRA	4-Africa-MidEast	134	1.6%
ALTAMIRA	5-Asia	91	1.1%
ALTAMIRA	6-AustraliaNZ	15	0.2%
ALTAMIRA	7-Other Region	2	0.0%
		8,514	100.0%
MANZANILLO	1-North America	3,783	36.3%
MANZANILLO	2-South America	2,028	19.4%
MANZANILLO	3-Europe	218	2.1%
MANZANILLO	4-Africa-MidEast	76	0.7%
MANZANILLO	5-Asia	3,989	38.2%
MANZANILLO	6-AustraliaNZ	330	3.2%
MANZANILLO	7-Other Region	13	0.1%
		10,436	100.0%
MAZATLAN	1-North America	11	3.1%
MAZATLAN	2-South America	20	5.6%
MAZATLAN	3-Europe	324	91.3%
		355	100.0%
PROGRESO	1-North America	2,310	98.1%
PROGRESO	2-South America	5	0.2%
PROGRESO	3-Europe	36	1.5%
PROGRESO	5-Asia	4	0.2%
		2,355	100.0%
SALINA CRUZ	1-North America	28	90.3%
SALINA CRUZ	5-Asia	3	9.7%
		31	100.0%
TAMPICO	1-North America	240	66.6%
TAMPICO	2-South America	54	15.0%
TAMPICO	3-Europe	19	5.3%
TAMPICO	4-Africa-MidEast	15	4.2%
TAMPICO	5-Asia	32	8.9%
TAMPICO	6-AustraliaNZ	0	0.0%
		360	100.0%
VERACRUZ	1-North America	3,135	39.9%
VERACRUZ	2-South America	1,688	21.5%
VERACRUZ	3-Europe	2,836	36.1%
VERACRUZ	4-Africa-MidEast	122	1.5%
VERACRUZ	5-Asia	73	0.9%
VERACRUZ	6-AustraliaNZ	0	0.0%
		7,854	100.0%

3.2.7 Mexico TEU Forecast

Table 3-20 summarizes the Global Insight TEU forecast for Mexico by trade area for the period 1995 to 2025.

The total TEU forecast between 2002 and 2025 is 6.1% per year. Imports are projected to grow at 6.6% compared with exports at 4.8%.

Asia shows the highest growth at 8.0% while Europe, North and South America range from 4.6 to 5.2%. Given the significant levels of Veracruz TEUs to and from Europe and North and South America, the unadjusted base forecast for the Port of Veracruz container trade is 4.4%.

Shipper and carrier interviews were conducted to identify factors that could impact the forecasted container growth rates. The total TEU forecast of 6.1% for Mexico and the Global Insight forecast of long term economic growth of 5% combined with the continued strong performance of the Port of Veracruz relative to the total Mexico market growth, support the potential for higher rates of container growth. In addition, the impact of recent and potential free trade agreements, especially with Europe and Latin America, will contribute to growth in the Port of Veracruz container trades.

Thus, despite the stronger growth projected for trade with Asia, much of which is routed via Mexico west coast ports, the Port of Veracruz is expected to continue to maintain its market share and sustain container growth at the national average of 6% (probable forecast) and potentially above the national average at 9% (optimistic forecast).

Table 3-20
Global Insight Mexico TEU Forecast

Import	CAGR02to25	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1-North America	4.2% MX	24,698	27,462	32,792	41,195	44,052	48,721	48,347	48,498	49,844	51,930	54,389	56,998	59,961	63,031	66,172	69,425
2-South America	5.3% MX	27,502	36,033	45,440	55,790	74,716	77,917	80,989	85,331	89,697	93,492	98,013	103,136	109,096	115,561	122,337	129,486
3-Europe	4.6% MX	67,200	82,594	117,338	197,912	190,586	211,531	214,723	220,420	227,140	235,692	246,578	258,615	273,070	288,956	305,425	322,470
4-Africa-MidEast	2.9% MX	11,255	14,060	15,807	19,379	20,119	20,393	20,552	20,945	21,284	21,772	22,346	23,128	23,810	24,505	25,421	26,154
5-Asia	8.3% MX	87,070	114,557	148,742	157,695	228,103	256,005	276,349	310,149	332,299	360,889	395,433	433,425	477,278	523,636	571,922	623,901
6-AustraliaNZ	3.7% MX	4,277	6,112	7,728	9,917	8,981	9,412	10,722	10,008	10,217	10,554	11,050	11,532	12,031	12,523	13,024	13,545
7-Other Region	5.6% MX	2,275	12,602	22,448	6,599	15,423	16,342	16,984	17,835	18,567	19,522	20,616	21,840	23,227	24,726	26,280	27,882
Total	6.6%	224,278	353,421	390,294	488,485	581,980	640,321	668,665	713,185	749,047	793,851	848,425	909,673	978,472	1,052,938	1,130,562	1,212,864

Export	CAGR02to25	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1-North America	5.6% MX	53,139	60,884	69,819	61,592	72,025	79,876	82,584	89,140	93,718	98,849	104,436	110,548	117,117	124,361	131,728	139,520
2-South America	4.3% MX	65,734	132,169	131,274	108,402	78,253	80,895	78,724	70,445	69,140	72,446	76,486	80,541	84,774	88,890	92,838	96,939
3-Europe	4.6% MX	67,780	80,304	78,513	77,914	81,348	87,991	89,205	91,807	96,736	103,425	110,367	117,629	124,264	129,834	134,650	139,942
4-Africa-MidEast	3.1% MX	4,241	9,857	12,906	8,532	4,514	4,757	4,800	4,851	4,941	5,087	5,244	5,424	5,617	5,796	5,959	6,129
5-Asia	4.6% MX	43,544	127,225	85,253	42,121	42,643	45,840	44,349	45,627	47,929	50,102	52,662	55,436	58,334	61,109	63,880	66,777
6-AustraliaNZ	4.4% MX	2,214	2,558	2,837	2,992	3,679	3,992	3,956	4,199	4,424	4,645	4,891	5,144	5,393	5,628	5,856	6,096
7-Other Region	3.7% MX	93	768	726	14,140	1,061	1,125	1,106	1,111	1,116	1,166	1,222	1,278	1,333	1,387	1,439	1,494
Total	4.8%	236,744	413,763	381,329	315,693	283,520	304,476	304,825	307,180	318,003	335,699	355,308	375,999	396,832	416,806	436,350	456,898

Total	CAGR02to25	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1-North America	5.2%	77,837	88,346	102,611	102,786	116,077	128,597	131,031	137,638	143,561	150,779	158,826	167,546	177,077	187,392	197,900	208,945
2-South America	4.9%	93,236	228,202	176,714	164,192	152,968	158,812	159,714	155,776	158,836	165,938	174,499	183,677	193,871	204,451	215,175	226,425
3-Europe	4.6%	134,980	162,898	195,851	275,826	271,932	299,522	303,928	312,227	323,876	339,117	356,944	376,244	397,334	418,590	440,075	462,412
4-Africa-MidEast	2.9%	15,496	23,917	28,713	27,911	24,633	25,150	25,352	25,796	26,225	26,839	27,590	28,552	29,427	30,301	31,380	32,283
5-Asia	8.0%	130,614	241,782	233,995	199,816	270,747	301,845	320,698	355,776	380,228	410,991	448,094	488,861	535,612	584,745	635,802	690,679
6-AustraliaNZ	3.9%	6,491	8,670	10,565	12,908	12,660	13,404	14,677	14,207	14,640	15,199	15,942	16,675	17,424	18,150	18,881	19,642
7-Other Region	5.5%	2,368	13,370	23,174	20,739	16,483	17,467	18,090	18,947	19,683	20,688	21,838	23,118	24,559	26,114	27,699	29,376
Total	6.1%	461,022	767,185	771,523	804,178	865,500	944,797	973,490	1,020,365	1,067,050	1,129,550	1,203,733	1,284,673	1,375,304	1,469,744	1,566,912	1,669,761

Import	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	CAGR02to25
1-North America	72,755	76,104	79,501	82,968	86,466	90,013	93,605	97,227	100,878	104,545	108,318	112,226	116,276	120,472	124,820	4.2%
2-South America	136,884	144,504	152,430	160,735	169,355	178,360	187,741	197,487	207,691	218,329	229,588	241,427	253,877	266,969	280,736	5.3%
3-Europe	340,030	357,601	375,485	393,776	412,288	431,196	450,403	469,843	489,691	509,595	530,254	551,751	574,120	597,395	621,614	4.6%
4-Africa-MidEast	27,088	27,807	28,795	29,553	30,512	31,264	32,231	33,215	34,028	35,064	36,100	37,167	38,265	39,395	40,560	2.9%
5-Asia	679,578	738,449	801,053	867,939	938,559	1,013,378	1,092,918	1,177,217	1,266,551	1,360,773	1,462,253	1,571,301	1,688,481	1,814,400	1,949,710	8.3%
6-AustraliaNZ	14,073	14,607	15,151	15,711	16,280	16,864	17,463	18,074	18,701	19,339	20,004	20,691	21,402	22,137	22,898	3.7%
7-Other Region	29,573	31,331	33,168	35,101	37,112	39,220	41,413	43,723	46,074	48,501	51,060	53,754	56,591	59,577	62,721	5.6%
Total	1,299,981	1,390,402	1,485,584	1,585,783	1,690,572	1,800,295	1,915,774	2,036,786	2,163,615	2,296,146	2,437,576	2,588,318	2,749,012	2,920,346	3,103,057	6.6%

Export	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	CAGR02to25
1-North America	147,726	156,343	165,401	174,897	184,824	195,212	206,062	217,406	229,261	241,615	254,544	268,164	282,514	297,631	313,558	5.6%
2-South America	101,235	105,847	110,690	115,771	121,100	126,610	132,314	138,240	144,385	150,686	157,195	163,975	171,046	178,423	186,118	4.3%
3-Europe	145,452	151,350	157,553	164,035	170,863	178,008	185,404	193,077	201,010	209,262	217,834	226,757	236,046	245,715	255,781	4.6%
4-Africa-MidEast	6,307	6,497	6,697	6,908	7,127	7,354	7,591	7,835	8,088	8,350	8,618	8,895	9,181	9,476	9,781	3.1%
5-Asia	69,769	72,902	76,148	79,550	83,111	86,810	90,654	94,652	98,820	103,147	107,638	112,324	117,214	122,317	127,643	4.6%
6-AustraliaNZ	6,345	6,613	6,890	7,181	7,489	7,809	8,146	8,497	8,865	9,248	9,645	10,059	10,492	10,942	11,413	4.4%
7-Other Region	1,550	1,609	1,670	1,733	1,798	1,865	1,934	2,005	2,079	2,154	2,229	2,308	2,389	2,472	2,559	3.7%
Total	478,384	501,161	525,050	550,076	576,313	603,668	632,105	661,713	692,507	724,471	757,703	792,482	828,881	866,978	906,851	4.8%

Total	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	CAGR02to25
1-North America	220,481	232,447	244,902	257,866	271,290	285,225	299,667	314,633	330,138	346,160	362,861	380,389	398,721	417,958	438,124	5.2%
2-South America	238,119	250,351	263,120	276,506	290,455	304,970	320,055	335,727	352,076	369,026	386,783	405,396	424,903	445,350	466,781	4.9%
3-Europe	485,482	508,951	533,038	557,811	583,150	609,203	635,807	662,920	690,701	718,856	748,088	778,508	810,165	843,110	877,394	4.6%
4-Africa-MidEast	33,396	34,304	35,493	36,461	37,639	38,618	39,822	41,051	42,117	43,414	44,718	46,062	47,446	48,871	50,340	2.9%
5-Asia	749,346	811,351	877,201	947,489	1,021,671	1,100,188	1,183,572	1,271,868	1,365,371	1,463,920	1,569,891	1,683,633	1,805,401	1,936,091	2,076,241	8.0%
6-AustraliaNZ	20,418	21,219	22,042	22,892	23,769	24,673	25,609	26,572	27,566	28,587	29,649	30,750	31,892	33,077	34,305	3.9%
7-Other Region	31,123	32,940	34,838	36,834	38,910	41,085	43,347	45,728	48,153	50,654	53,289	56,061	58,977	62,045	65,273	5.5%
Total	1,778,365	1,891,564	2,010,634	2,135,859	2,266,885	2,403,964	2,547,879	2,698,499	2,856,122	3,020,616	3,195,279	3,380,678	3,577,505	3,786,502	4,008,457	6.1%

Source: Global Insight
Note: The forecast for 2022 to 2025 is based on the CAGR for 2020 to 2021.

3.2.8 Container Carriers

Table 3-21 summarizes the TEUs by carrier for the Port of Veracruz and the Port of Altamira. The table has been ranked and sorted based on the total containers carried by each carrier by direction to and from the two ports. This list of carriers provided inputs to the carrier interviews.

As shown in Table 3-21, the major carriers call both the Port of Veracruz and the Port of Altamira with approximately 50% to 75% of the total TEUs handled by the largest carriers at the two ports handled at the Port of Veracruz.

Table 3-21
Veracruz Altamira Container Carriers

Direction	SHIPLINE		SLINE CODE	Altamira TEUs	VERACRUZ	SLINE CODE	Veracruz TEUs	Total TEUs	%Veracruz of Total
Import	MEXICAN LINE (TMM)	ALTAMIRA	MEXI	2,486	VERACRUZ	MEXI	7,124	9,611	74.1%
Import	MEDITERRANEAN SHIPPING COMPANY	ALTAMIRA	MDSC	1,978	VERACRUZ	MDSC	6,224	8,201	75.9%
Export	MEXICAN LINE (TMM)	ALTAMIRA	MEXI	1,996	VERACRUZ	MEXI	2,480	4,475	55.4%
Import	HAPAG LLOYD	ALTAMIRA	HAPL	451	VERACRUZ	HAPL	1,785	2,236	79.8%
Export	MEDITERRANEAN SHIPPING COMPANY	ALTAMIRA	MDSC	1,005	VERACRUZ	MDSC	820	1,825	44.9%
Import	LIBRA NAVEGACAO SA (LIBRA)	ALTAMIRA	LBNA	525	VERACRUZ	LBNA	1,143	1,668	68.5%
Import	MAERSK SEALAND	ALTAMIRA	MLSL	658	VERACRUZ	MLSL	753	1,411	53.4%
Export	MAERSK SEALAND	ALTAMIRA	MLSL	182	VERACRUZ	MLSL	992	1,175	84.5%
Export	HAPAG LLOYD	ALTAMIRA	HAPL	599	VERACRUZ	HAPL	545	1,143	47.7%
Import	P & O CONTAINERS / NED LLOYD	ALTAMIRA	PONL	354	VERACRUZ	PONL	681	1,035	65.8%
Export	COSTA CONTAINER LINE	ALTAMIRA	CTCL	632	VERACRUZ	CTCL	339	971	34.9%
Import	CMA-CGM THE FRENCH LINE	ALTAMIRA	CACG	92	VERACRUZ	CACG	863	955	90.4%
Export	P & O CONTAINERS / NED LLOYD	ALTAMIRA	PONL	591	VERACRUZ	PONL	277	868	31.9%
Export	CROWLEY LINER SERVICES	ALTAMIRA	CRLS	150	VERACRUZ	CRLS	552	702	78.6%
Export	LYKES	ALTAMIRA	LYKE	677	VERACRUZ			677	0.0%
Export	LIBRA NAVEGACAO SA (LIBRA)	ALTAMIRA	LBNA	445	VERACRUZ	LBNA	207	652	31.7%
Import	COMPANIA CHILENA DE NAVEGACION INTE	ALTAMIRA	CCNI	147	VERACRUZ	CCNI	490	638	76.9%
Import	LYKES	ALTAMIRA	LYKE	598	VERACRUZ			598	0.0%
Import	COLUMBUS LINES	ALTAMIRA	COLL	272	VERACRUZ	COLL	263	535	49.1%
Import	AMERICAN PRESIDENT LINES	ALTAMIRA	AMPL	165	VERACRUZ	AMPL	339	504	67.3%
Import	ORIENT OVERSEAS CONTAINER LINE	ALTAMIRA	OOCL	49	VERACRUZ	OOCL	424	473	89.6%
Export	ZIM CONTAINER	ALTAMIRA	ZIML		VERACRUZ	ZIML	468	468	100.0%
Import	CHILEAN LINE	ALTAMIRA	CSAV	178	VERACRUZ	CSAV	287	466	61.7%
Export	CMA-CGM THE FRENCH LINE	ALTAMIRA	CACG	178	VERACRUZ	CACG	267	445	60.0%
Export	CHILEAN LINE	ALTAMIRA	CSAV	261	VERACRUZ	CSAV	177	438	40.5%
Import	CROWLEY LINER SERVICES	ALTAMIRA	CRLS	6	VERACRUZ	CRLS	410	416	98.6%
Import	COSTA CONTAINER LINE	ALTAMIRA	CTCL	397	VERACRUZ	CTCL		397	0.0%
Export	COMPANIA CHILENA DE NAVEGACION INTE	ALTAMIRA	CCNI	256	VERACRUZ	CCNI	133	389	34.2%
Import	ZIM CONTAINER	ALTAMIRA	ZIML		VERACRUZ	ZIML	327	327	100.0%
Export	AMERICAN PRESIDENT LINES	ALTAMIRA	AMPL	254	VERACRUZ	AMPL	56	310	17.9%
Export	MELFI MARINE	ALTAMIRA	MELF	198	VERACRUZ	MELF	65	263	24.7%
Export	COLUMBUS LINES	ALTAMIRA	COLL	160	VERACRUZ	COLL	68	228	29.8%
Export	ORIENT OVERSEAS CONTAINER LINE	ALTAMIRA	OOCL	160	VERACRUZ	OOCL	58	218	26.7%
Import	STOLT NIELSON	ALTAMIRA	STTN	0	VERACRUZ	STNS	211	211	100.0%
Import	MELFI MARINE	ALTAMIRA	MELF	35	VERACRUZ	MELF	170	205	82.9%
Export	CORAL CONTAINER LINES	ALTAMIRA	CCLN	95	VERACRUZ	CCLN	99	194	51.0%
Import	DEPPE	ALTAMIRA	DEPP	31	VERACRUZ	DEPP	161	192	83.9%
Import	NORDANA	ALTAMIRA	NORD	55	VERACRUZ	NORD	136	191	71.1%
Import	CORAL CONTAINER LINES	ALTAMIRA	CCLN	102	VERACRUZ	CCLN	85	187	45.6%
Import	EMPRESA DE NAVEGACAO ALIANCA S A	ALTAMIRA	EMDN	132	VERACRUZ	EMDN	51	183	28.0%
Export	CROWLEY AMERICAN TRANSPORT INC	ALTAMIRA	CRMT	156	VERACRUZ	CRMT	15	171	8.8%
Export	CONTSHIP CONTAINERLINES LTD	ALTAMIRA	CSCL	168	VERACRUZ			168	0.0%
Export	MITSUI OSK LINE	ALTAMIRA	OSKL	97	VERACRUZ	OSKL	53	150	35.3%
Export	NORDANA	ALTAMIRA	NORD	136	VERACRUZ	NORD	3	139	2.2%
Export	EMPRESA DE NAVEGACAO ALIANCA S A	ALTAMIRA	EMDN	51	VERACRUZ	EMDN	57	108	53.1%
Import	OLDENDORFF CARRIERS (INDOTRANS) LTD	ALTAMIRA	OCIO		VERACRUZ	OCIO	98	98	100.0%
Export	TADAY MARINE	ALTAMIRA	TDYM	38	VERACRUZ	TDYM	30	68	44.3%
Import	CONTSHIP CONTAINERLINES LTD	ALTAMIRA	CSCL	43	VERACRUZ	CSCL		43	0.0%
Import	ITALIAN LINE	ALTAMIRA	ITAL	43	VERACRUZ	ITAL		43	0.0%
Import	MITSUI OSK LINE	ALTAMIRA	OSKL	20	VERACRUZ	OSKL	19	39	48.4%
Import	SPANISH LINE	ALTAMIRA	SPAN	28	VERACRUZ	SPAN	9	37	24.6%
Import	CROWLEY AMERICAN TRANSPORT INC	ALTAMIRA	CRMT	12	VERACRUZ	CRMT	23	35	66.0%
Export	DEPPE	ALTAMIRA	DEPP	10	VERACRUZ	DEPP	12	22	54.5%
Import	SEABOARD MARINE LTD	ALTAMIRA	SBMR		VERACRUZ	SBMR	21	21	100.0%
Import	MELBRIDGE CONTAINER LINE	ALTAMIRA	MECL	15	VERACRUZ			15	0.0%
Export	PAN AMERICAN INDEPENDENT LINE	ALTAMIRA	PAML		VERACRUZ	PAML	15	15	100.0%
Export	SPANISH LINE	ALTAMIRA	SPAN	2	VERACRUZ	SPAN	7	9	77.8%
Import	TCA S R L (INTL)	ALTAMIRA	TCAS	4	VERACRUZ	TCAS		4	0.0%
Import	PAN AMERICAN INDEPENDENT LINE	ALTAMIRA	PAML		VERACRUZ	PAML	4	4	100.0%
Export	TCA S R L (INTL)	ALTAMIRA	TCAS	4	VERACRUZ	TCAS		4	0.0%
Import	SAFMARINE	ALTAMIRA	SAFM		VERACRUZ	SAFM	3	3	100.0%
Import	GULF AFRICA LINE	ALTAMIRA	GFAF	2	VERACRUZ	GFAF		2	0.0%
Export	SEABOARD MARINE LTD	ALTAMIRA	SBMR		VERACRUZ	SBMR	2	2	100.0%
Import	SETH SHIPPING CORP	ALTAMIRA	SETH		VERACRUZ	SETH	1	1	100.0%

3.2.9 Shipper Consignee Detail

The following tables show the shipper and consignee detail for the total Mexico flows of major non container commodities in May 2003. These tables identified the shippers and consignees for the major flows to support the shipper/consignee interviews. The commodities included are:

Grain Imports

Auto Imports

Oilseed Imports (Soybeans)

Scrap Imports

Fertilizer Imports

Auto Exports

Steel Imports

Steel Exports

A selection of the shippers and consignees in the following tables were contacted with respect to overall market growth and Port of Veracruz market share factors. Selected analysis of the data in the following tables by port of load and discharge in Mexico was consistent with the Port of Veracruz focus on origins and destinations east of Mexico as compared with origins and destinations west of Mexico routed through Mexico west coast ports.

(Note in the following tables country ZZ represents an unidentified country.)

Table 3-22A
Mexico Grain Import Shippers and Consignees
May-03

WEFA77CODE	WEFA77NAME	CONSIGNEE	CITY	FOREIGN PORT OF LOAD	SHIPPER	COUNTRY OF SHIPPER	Metric Tons	Perc	Cumulative Percentage
C1A	Grain	GRUPO ALTEX	LERMA	THUNDER BAY	CANADIAN WHEAT BOARD	ZZ	177,951	17.3%	17.3%
C1A	Grain	IND ACEITERA	ZZ	VANCOUVER BC	CARGILL	ZZ	168,000	16.4%	33.7%
C1A	Grain	IND PATRONA	CORDOBA	THUNDER BAY	AGRICORE	CANADA	140,279	13.7%	47.4%
C1A	Grain	ORDER OF SHIPPER	ZZ	DESTREHAN	ORDER OF SHIPPER	ZZ	44,312	4.3%	51.7%
C1A	Grain	ARANCIA	GUADALAJARA	NEW ORLEANS	ZEN NOH GRAIN	LA	38,645	3.8%	55.5%
C1A	Grain	ARANCIA	GUADALAJARA	NEW ORLEANS	CENEX HARVEST SYSTEMS	MN	38,085	3.7%	59.2%
C1A	Grain	ARCHER DANIELS MIDLAND	MEXICO	NEW ORLEANS	ADM MILLING	IL	37,544	3.7%	62.8%
C1A	Grain	CARGILL	MEXICO	HOUSTON	CARGILL	ZZ	35,468	3.5%	66.3%
C1A	Grain	MOLTRIM	MEXICO	HOUSTON	CARGILL	ZZ	31,330	3.1%	69.3%
C1A	Grain	CARGILL	MEXICO	CORPUS CRISTI	CARGILL	ZZ	26,830	2.6%	71.9%
C1A	Grain	ARANCIA	GUADALAJARA	NEW ORLEANS	CARGILL	ZZ	24,136	2.4%	74.3%
C1A	Grain	AGROPECUARIA EL CONVENTO	TECAMACHALCO	NEW ORLEANS	ADM MILLING	IL	19,330	1.9%	76.2%
C1A	Grain	ARCHER DANIELS MIDLAND	MEXICO	TOLEDO	ARCHER DANIELS MIDLAND	IL	17,889	1.7%	77.9%
C1A	Grain	JORGE A DE LA GARZA AVINA	ZZ	NEW ORLEANS	RICE CO	CA	17,254	1.7%	79.6%
C1A	Grain	NUTRIMIENTOS AGROPECUARIOS CARGILL	UMAN	HOUSTON	CARGILL	MN	16,294	1.6%	81.2%
C1A	Grain	GARCILL	MEXICO	HOUSTON	CARGILL	TX	15,800	1.5%	82.7%
C1A	Grain	NACIONAL ALMACENADORA	MONTERREY	S LOUISIANA	BARTLETT GRAIN	MO	15,528	1.5%	84.2%
C1A	Grain	NUTRIMIENTOS AGROPECUARIOS CARGILL	UMAN	WESTWEGO	CARGILL	MN	15,400	1.5%	85.7%
C1A	Grain	GRUPO PECUARIO SAN ANTONIO	CORDOBA	NEW ORLEANS	ADM MILLING	IL	12,384	1.2%	87.0%
C1A	Grain	ARANCIA	GUADALAJARA	NEW ORLEANS	ORDER OF SHIPPER	ZZ	10,235	1.0%	87.9%
C1A	Grain	AGRIBANDS PURINA	MEXICO	NEW ORLEANS	CARGILL	ZZ	10,098	1.0%	88.9%
C1A	Grain	NACIONAL ALMACENADORA	MONTERREY	NEW ORLEANS	ADM MILLING	IL	8,706	0.8%	89.8%
C1A	Grain	MALTA TEXO	MEXICO	NEW ORLEANS	ADM MILLING	IL	7,459	0.7%	90.5%
C1A	Grain	PROTEINOL	MERIDA	NEW ORLEANS	CENEX HARVEST SYSTEMS	MN	7,040	0.7%	91.2%
C1A	Grain	LASER MARITIMO	ZZ	NEW ORLEANS	RICE CO	CA	6,784	0.7%	91.9%
C1A	Grain	PROVEEDORA DE ALIMENTOS AVEPECUARIO	MERIDA	WESTWEGO	CARGILL	MN	6,050	0.6%	92.4%
C1A	Grain	CARGILL	MEXICO	NEW ORLEANS	CARGILL	ZZ	6,045	0.6%	93.0%
C1A	Grain	PROVEEDORA DE ALIMENTOS AVEPECUARIO	MERIDA	HOUSTON	CARGILL	MN	6,026	0.6%	93.6%
C1A	Grain	ARROCERA COVADONGA	ECATEPEC DE M	NEW ORLEANS	ADM MILLING	IL	5,500	0.5%	94.2%
C1A	Grain	A A GERARDO LUIS LARA VALERIO	ZZ	NEW ORLEANS	RICE CO	CA	5,055	0.5%	94.6%
C1A	Grain	GOMEZ SANUDO	VERACRUZ	NEW ORLEANS	RICE CO	CA	4,179	0.4%	95.1%
C1A	Grain	UNION DE PRODUCTOS AGROPECUARIOS	TECAMACHALCO	NEW ORLEANS	ADM MILLING	IL	4,000	0.4%	95.4%
C1A	Grain	NUTRIMENTOS LA GRANJA	TRES VALLES	NEW ORLEANS	ADM MILLING	IL	4,000	0.4%	95.8%
C1A	Grain	GRANELERAS MONTES	QUERETARO	NEW ORLEANS	ADM MILLING	IL	3,965	0.4%	96.2%
C1A	Grain	BACHOCO	CELAYA	NEW ORLEANS	ADM MILLING	IL	3,800	0.4%	96.6%
C1A	Grain	GRUPO PORCICOLA DE YUCATAN	MERIDA	NEW ORLEANS	ARCHER DANIELS MIDLAND	IL	3,527	0.3%	96.9%
C1A	Grain	COMPLEJO PORCICOLA AGROIND	MERIDA	NEW ORLEANS	ARCHER DANIELS MIDLAND	IL	3,500	0.3%	97.3%
C1A	Grain	ALIMENTOS BALANCEADOS & ESPECIALIZA	CUAUTITLAN	NEW ORLEANS	ADM MILLING	IL	2,991	0.3%	97.6%
C1A	Grain	PRODUCTORES AGROPECUARIOS TEPEXPAN	TEPEXPAN	NEW ORLEANS	ADM MILLING	IL	2,946	0.3%	97.9%
C1A	Grain	SUMINISTROS DE MAIZ DEL MAYAB	MERIDA	NEW ORLEANS	ARCHER DANIELS MIDLAND	IL	2,755	0.3%	98.1%
C1A	Grain	RALSTON PURINA	CUAUTITLAN	NEW ORLEANS	ADM MILLING	IL	2,561	0.2%	98.4%
C1A	Grain	EDUARDO JOSE STERLIG BOURS	QUERETARO	NEW ORLEANS	ADM MILLING	IL	2,233	0.2%	98.6%
C1A	Grain	ALIMENTOS BALANCEADOS LORGAM	MERIDA	NEW ORLEANS	ARCHER DANIELS MIDLAND	IL	1,650	0.2%	98.8%
C1A	Grain	FORRAJES LA LLOSA	ECATEPEC DE M	NEW ORLEANS	ADM MILLING	IL	1,600	0.2%	98.9%
C1A	Grain	JORGE ENRIQUE FERNANDEZ MARTIN	MERIDA	NEW ORLEANS	ARCHER DANIELS MIDLAND	IL	1,300	0.1%	99.0%
C1A	Grain	PROVEEDORA DE ALIMENTOS AVEPECUARIO	MERIDA	SAPELE	TRADICO	MN	1,229	0.1%	99.2%
C1A	Grain	NUTRIMIENTOS AGROPECUARIOS CARGILL	UMAN	SAPELE	TRADICO	MN	1,225	0.1%	99.3%
C1A	Grain	MOLINO EL PROGRESO	MERIDA	NEW ORLEANS	ARCHER DANIELS MIDLAND	IL	1,020	0.1%	99.4%
C1A	Grain	PRODUCTORA DE ALIMENTO GANADERO	HUAMANTLA	NEW ORLEANS	ADM MILLING	IL	1,000	0.1%	99.5%
C1A	Grain	ALIMENTOS BALANCEADOS & SERVICIOS I	SAN JUAN DEL	NEW ORLEANS	ADM MILLING	IL	1,000	0.1%	99.6%
C1A	Grain	PRODUCTORA NACIONAL DE HUEVO	MERIDA	NEW ORLEANS	ARCHER DANIELS MIDLAND	IL	930	0.1%	99.7%
C1A	Grain	POLLO IND	MERIDA	NEW ORLEANS	ARCHER DANIELS MIDLAND	IL	870	0.1%	99.7%
C1A	Grain	ALIMENTOS BALANCEADOS DE ORIENTE	KANASIN	NEW ORLEANS	ARCHER DANIELS MIDLAND	IL	800	0.1%	99.8%
C1A	Grain	GRUPO GOMEZ COBOS	QUERETARO	NEW ORLEANS	ADM MILLING	IL	679	0.1%	99.9%
C1A	Grain	AVIPRODUCTOS SANJOR	UMAN	NEW ORLEANS	ARCHER DANIELS MIDLAND	IL	650	0.1%	99.9%
C1A	Grain	PLANTA INCUBADORA	TUXTLA GUTIER	NEW ORLEANS	ADM MILLING	IL	288	0.0%	100.0%
C1A	Grain	ESPECIAS NATURALES	GUADALAJARA	VANCOUVER BC	INT GRAIN TRADE	CANADA	210	0.0%	100.0%
C1A	Grain	COMERCIALIZADORA TOULON	MERIDA	BIENVILLE	GREAT WESTERN PRODUCTS	AL	19	0.0%	100.0%
							1,026,385	100.0%	

Table 3-22B
Mexico Auto Import Shipper Consignee Detail
May-03

WEFA77CODE	WEFA77NAME	CONSIGNEE	CITY	FOREIGN PORT OF LOAD	SHIPPER	COUNTRY OF SHIPPER	Metric Tons	Percent	Cumulative Percentage
C3843A	Motor Vehicles	VOLKSWAGEN	PUEBLA	SANTOS	VOLKSWAGEN	BRAZIL	7,207	21.6%	21.6%
C3843A	Motor Vehicles	GENERAL MOTORS	ZZ	ZARATE	ORDER OF SHIPPER	ZZ	3,127	9.4%	31.0%
C3843A	Motor Vehicles	DAIMLER CHRYSLER	MEXICO	ULSAN	HYUNDAI MOTOR	KOR REP	3,067	9.2%	40.2%
C3843A	Motor Vehicles	SERVICIO INTEGRAL AUTOMOTOR	MEXICO	SALVADOR	FORD MOTORS	BRAZIL	2,944	8.8%	49.0%
C3843A	Motor Vehicles	PEUGEOT	ZZ	LE HAVRE	PEUGEOT	ZZ	1,839	5.5%	54.6%
C3843A	Motor Vehicles	VOLKSWAGEN	PUEBLA	ZARATE	VOLKSWAGEN	ARGENT	1,399	4.2%	58.7%
C3843A	Motor Vehicles	SERVICIO INTEGRAL AUTOMOTOR	MEXICO	SANTOS	FORD MOTORS	BRAZIL	1,022	3.1%	61.8%
C3843A	Motor Vehicles	GENERAL MOTORS	ZZ	SANTOS	ORDER OF SHIPPER	ZZ	982	2.9%	64.8%
C3843A	Motor Vehicles	SERVICIO INTEGRAL AUTOMOTOR	MEXICO	ZARATE	FORD MOTORS	ARGENT	926	2.8%	67.5%
C3843A	Motor Vehicles	ORDER OF SHIPPER	ZZ	ZEEBRUGGE	ORDER OF SHIPPER	ZZ	905	2.7%	70.3%
C3843A	Motor Vehicles	GENERAL MOTORS	ZZ	ZEEBRUGGE	ORDER OF SHIPPER	ZZ	883	2.6%	72.9%
C3843A	Motor Vehicles	VOLKSWAGEN	PUEBLA	EMDEN	VOLKSWAGEN	GERMANY	833	2.5%	75.4%
C3843A	Motor Vehicles	NISSAN MEXICANA	MEXICO	KANDA	NISSAN MOTOR	JAPAN	798	2.4%	77.8%
C3843A	Motor Vehicles	HONDA MOTORS	EL SALTO	CHIBA	HONDA MOTORS	ZZ	762	2.3%	80.1%
C3843A	Motor Vehicles	NISSAN MEXICANA	MEXICO	KANDA	NISSAN MOTOR	ZZ	675	2.0%	82.1%
C3843A	Motor Vehicles	GENERAL MOTORS	MEXICO	ARICA	GENERAL MOTORS	CHILE	631	1.9%	84.0%
C3843A	Motor Vehicles	VOLKSWAGEN	PUEBLA	ZARATE	VOLKSWAGEN	ZZ	520	1.6%	85.6%
C3843A	Motor Vehicles	SERVICIO INTEGRAL AUTOMOTOR	MEXICO	ZEEBRUGGE	VOLVO	SWEDEN	467	1.4%	87.0%
C3843A	Motor Vehicles	NISSAN MEXICANA	MEXICO	TYNE	NISSAN MOTOR	ZZ	446	1.3%	88.3%
C3843A	Motor Vehicles	GENERAL MOTORS	TOLUCA	YOKOHAMA	G M DAEWOO AUTO & TECHNOLOGY	KOR REP	390	1.2%	89.5%
C3843A	Motor Vehicles	WALLENIUS LINES	ZZ	SANTOS	WALLENIUS LINES	ZZ	304	0.9%	90.4%
C3843A	Motor Vehicles	GRUPO PEREDO	XALAPA	SHANGHAI	TAIZHOU CHENGFEI MOTORCYCLE MFG	CHINA P	303	0.9%	91.3%
C3843A	Motor Vehicles	TOYOTA MOTORS	TIJUANA	BALTIMORE	TOYOTA MOTOR	CA	286	0.9%	92.2%
C3843A	Motor Vehicles	DAIMLER CHRYSLER	ZZ	BREMERHAVEN	DAIMLER CHRYSLER	ZZ	236	0.7%	92.9%
C3843A	Motor Vehicles	SERVICIO INTEGRAL AUTOMOTOR	MEXICO	ZEEBRUGGE	FORD MOTORS	ZZ	236	0.7%	93.6%
C3843A	Motor Vehicles	VOLVO	TULTITLAN	ZEEBRUGGE	VOLVO	SWEDEN	192	0.6%	94.1%
C3843A	Motor Vehicles	PEUGEOT	MEXICO	ZARATE	PEUGEOT	ZZ	192	0.6%	94.7%
C3843A	Motor Vehicles	EUROGROUP	MEXICO	HAMBURGO	GOLDHOFER AKTIENGESELLSCHAFT	ALEMANI	152	0.5%	95.2%
C3843A	Motor Vehicles	AMERICAN PRESIDENT LINES	MANZANILLO	SHANGHAI	AMERICAN PRESIDENT LINES	MEXICO	150	0.5%	95.6%
C3843A	Motor Vehicles	PEUGEOT	MEXICO	SN ANTONIO CH	AUTOMOTORES FRANCO CHILENA	CHILE	150	0.4%	96.1%
C3843A	Motor Vehicles	BMW OF NORTH AMERICA	MEXICO	CHARLESTON SC	BMW OF NORTH AMERICA	ZZ	147	0.4%	96.5%
C3843A	Motor Vehicles	VOLKSWAGEN	PUEBLA	EMDEN	AUDI	ALEMANI	146	0.4%	97.0%
C3843A	Motor Vehicles	SERVICIO INTEGRAL AUTOMOTOR	MEXICO	ZEEBRUGGE	WERKE AKTIENGESELLSCHAFT	ZZ	143	0.4%	97.4%
C3843A	Motor Vehicles	GROUP PEREDO	XALAPA	SHANGHAI	JIANGSU SINSKI MOTORCYCLE	ZZ	141	0.4%	97.8%
C3843A	Motor Vehicles	ORDER OF SHIPPER	ZZ	NAGOYA	ORDER OF SHIPPER	ZZ	138	0.4%	98.2%
C3843A	Motor Vehicles	VOLVO	MEXICO	ZEEBRUGGE	VOLVO	SWEDEN	132	0.4%	98.6%
C3843A	Motor Vehicles	RENAULT	MEXICO	LE HAVRE	RENAULT	ZZ	122	0.4%	99.0%
C3843A	Motor Vehicles	AMERICAN PRESIDENT LINES	MANZANILLO	CHONGQING	AMERICAN PRESIDENT LINES	MEXICO	117	0.3%	99.3%
C3843A	Motor Vehicles	NISSAN MEXICANA	MEXICO	YOKOSUKA	NISSAN MOTOR	ZZ	115	0.3%	99.7%
C3843A	Motor Vehicles	GIGANTE	MEXICO	JAWAHARLAL NE	MAJESTIC AUTO	INDIA	110	0.3%	100.0%
							33,334		
							0		
							33,334		

Table 3-22C
Mexico Oilseed Import Shipper Consignee Detail
May-03

WEFA77 CODE	WEFA77 NAME	CONSIGNEE	CITY	FOREIGN PORT OF LOAD	SHIPPER	COUNTRY OF SHIPPER	Metric tons	Perc	Cumulative Percentage
C1B	Oil Seeds	PROTEINOL	MERIDA	NEW ORLEANS	CENEX HARVEST SYSTEMS	MN	55,045	22.3%	22.3%
C1B	Oil Seeds	CARGILL	MEXICO	NEW ORLEANS	CARGILL	ZZ	37,799	15.3%	37.6%
C1B	Oil Seeds	ORDER OF SHIPPER	ZZ	DESTREHAN	ORDER OF SHIPPER	ZZ	33,411	13.5%	51.1%
C1B	Oil Seeds	FABRICA DE JABON CORONA	ECATEPEC DE M	NECOCHEA	CONCORDIA TRDG	NETHLDS	28,875	11.7%	62.8%
C1B	Oil Seeds	IND PATRONA	ZZ	NEW ORLEANS	CENEX HARVEST SYSTEMS	MN	26,250	10.6%	73.4%
C1B	Oil Seeds	AGRIBANDS PURINA	MEXICO	NEW ORLEANS	CARGILL	ZZ	23,502	9.5%	83.0%
C1B	Oil Seeds	CONSORCIO TEC	VERACRUZ	NECOCHEA	NOBLES	ARGENT	18,900	7.7%	90.6%
C1B	Oil Seeds	ARCHER DANIELS MIDLAND	MEXICO	NEW ORLEANS	ADM MILLING	IL	5,026	2.0%	92.6%
C1B	Oil Seeds	ACEITERA EL PARAISO	PUEBLA	NEW ORLEANS	ADM MILLING	IL	5,025	2.0%	94.7%
C1B	Oil Seeds	AVIPRODUCTOS SANJOR	UMAN	NEW ORLEANS	ARCHER DANIELS MIDLAND	IL	2,310	0.9%	95.6%
C1B	Oil Seeds	POLLO IND	MERIDA	NEW ORLEANS	ARCHER DANIELS MIDLAND	IL	1,643	0.7%	96.3%
C1B	Oil Seeds	JORGE ENRIQUE FERNANDEZ MARTIN	MERIDA	NEW ORLEANS	ARCHER DANIELS MIDLAND	IL	1,544	0.6%	96.9%
C1B	Oil Seeds	PRODUCTORA NACIONAL DE HUEVO	MERIDA	NEW ORLEANS	ARCHER DANIELS MIDLAND	IL	1,123	0.5%	97.4%
C1B	Oil Seeds	COMPLEJO PORCICOLA AGROIND	MERIDA	NEW ORLEANS	ARCHER DANIELS MIDLAND	IL	880	0.4%	97.7%
C1B	Oil Seeds	ORDER OF SHIPPER	ZZ	BUENOS AIR AG	ORDER OF SHIPPER	ZZ	718	0.3%	98.0%
C1B	Oil Seeds	ORDER OF SHIPPER	ZZ	SANTOS	ORDER OF SHIPPER	ZZ	585	0.2%	98.2%
C1B	Oil Seeds	GALDISA	MEXICO	QINGDAO	RIZHAO YUHE FOOD	CHINA P	554	0.2%	98.5%
C1B	Oil Seeds	VIRGILIO ELIZONDO	ZZ	QINGDAO	SHANDONG LINYI CHENGFENG FOODSTUFFS	CHINA P	429	0.2%	98.6%
C1B	Oil Seeds	ORDER OF SHIPPER	ZZ	QINGDAO	ORDER OF SHIPPER	ZZ	409	0.2%	98.8%
C1B	Oil Seeds	ORDER OF SHIPPER	ZZ	PTO CABELLO	ORDER OF SHIPPER	ZZ	336	0.1%	98.9%
C1B	Oil Seeds	VIRGILIO ELIZONDO	ZZ	QINGDAO	SHANDONG MENGYIN HUARUN IMP & EXP	ZZ	296	0.1%	99.1%
C1B	Oil Seeds	VIRGILIO ELIZONDO	ZZ	QINGDAO	FOREING TRADE	ZZ	236	0.1%	99.2%
C1B	Oil Seeds	ORDER OF SHIPPER	ZZ	KANDLA	ORDER OF SHIPPER	ZZ	190	0.1%	99.2%
C1B	Oil Seeds	ORDER OF SHIPPER	ZZ	BARCELONA SP	ORDER OF SHIPPER	ZZ	152	0.1%	99.3%
C1B	Oil Seeds	VIRGILIO ELIZONDO	ZZ	QINGDAO	SHANDONG LINYI CHENGFENG FOODSTUFFS	ZZ	149	0.1%	99.3%
C1B	Oil Seeds	VIRGILIO ELIZONDO	ZZ	QINGDAO	FOREINGTRADE GROUP	ZZ	128	0.1%	99.4%
C1B	Oil Seeds	VIRGILIO ELIZONDO	ZZ	QINGDAO	QINGDAO RUI SHENG FOOD	ZZ	126	0.1%	99.5%
C1B	Oil Seeds	SELECCIONADORA DE CACAHUATES	GUADALAJARA	QINGDAO	GENESIS	ZZ	112	0.0%	99.5%
C1B	Oil Seeds	HUGO HERRERA	MANZANILLO	QINGDAO	SHANDONG MENGYIN HUARUN IMP & EXP	CHINA P	111	0.0%	99.5%
C1B	Oil Seeds	DIPASA	ZZ	QINGDAO	ANHUI HONGFENG TRADE	ZZ	109	0.0%	99.6%
C1B	Oil Seeds	DIPASA	ZZ	BUSAN	AHCOF INTL DEVELOPMENT	ZZ	103	0.0%	99.6%
C1B	Oil Seeds	DIPASA	ZZ	KANDLA	ORDER OF SHIPPER	ZZ	95	0.0%	99.7%
C1B	Oil Seeds	SELECCIONADORA DE CACAHUATES	TLAJOMULCO DE	QINGDAO	GENESIS	ZZ	93	0.0%	99.7%
C1B	Oil Seeds	ORDER OF SHIPPER	ZZ	MALTA	ORDER OF SHIPPER	ZZ	57	0.0%	99.7%
C1B	Oil Seeds	DIPASA	CORTAZAR	QINGDAO	JUNAN ZHONGSHENG CEREALS OILS	ZZ	56	0.0%	99.8%
C1B	Oil Seeds	CEREALES & CHILES SECOS AZTECA	GUADALAJARA	QINGDAO	TOP PEARL	ZZ	56	0.0%	99.8%
C1B	Oil Seeds	FES CARGO	ZZ	QINGDAO	ETERNITY INTL	ZZ	56	0.0%	99.8%
C1B	Oil Seeds	DIPASA	CORTAZAR	QINGDAO	LINYI LIFENG FOODS STUFF	ZZ	56	0.0%	99.8%
C1B	Oil Seeds	DISTR INTL DE PRODUCTOS AGRICOLAS	ZZ	QINGDAO	SHANDONG MENGYIN HUARUN IMP & EXP	CHINA P	53	0.0%	99.8%
C1B	Oil Seeds	ORDER OF SHIPPER	ZZ	VARNA	ORDER OF SHIPPER	ZZ	51	0.0%	99.9%
C1B	Oil Seeds	RAMOS HERMANOS INTL	ZZ	QINGDAO	QINGDAO EAST SUN FOODS	ZZ	39	0.0%	99.9%
C1B	Oil Seeds	ESPECIAS NATURALES	GUADALAJARA	QINGDAO	QINGDAO EAST SUN FOODS	CHINA P	37	0.0%	99.9%
C1B	Oil Seeds	TRANSPORTE MULTIMODAL	MEXICO	QINGDAO	GLORY SHPG	ZZ	36	0.0%	99.9%
C1B	Oil Seeds	EL BOTANERO	MERIDA	RIO GRANDE BR	ALL FOOD	ZZ	36	0.0%	99.9%
C1B	Oil Seeds	ABASCAL	VERACRUZ	BOURGAS	MIRKO INTL	BULGAR	27	0.0%	99.9%
C1B	Oil Seeds	ANTONIO LOPEZ ABASCAL ZAMORA	VERACRUZ	BREMEN	BALCHO AGRO TRADE	BULGAR	25	0.0%	99.9%
C1B	Oil Seeds	ORDER OF SHIPPER	ZZ	GIOIA TAURO	ORDER OF SHIPPER	ZZ	25	0.0%	100.0%
C1B	Oil Seeds	TRANS MARITIME	MONTERREY	QINGDAO	JARDINE CCTA LOGISTICS SERVICE	CHINA P	25	0.0%	100.0%
C1B	Oil Seeds	UNIVERSAL CARGO	MEXICO	PENANG	ASIA PACIFIC FREIGHT SYSTEMS	MALASIA	21	0.0%	100.0%
C1B	Oil Seeds	ESPECIAS NATURALES	MEXICO	QINGDAO	QINGDAO EAST SUN FOODS	ZZ	19	0.0%	100.0%
C1B	Oil Seeds	T J HARKINS	HIGHLAND PK	QUETZAL	AGRO PACIFIC	GUATMAL	18	0.0%	100.0%
C1B	Oil Seeds	T J HARKINS	WOOD DALE	QUETZAL	AGROMUNDO	GUATMAL	18	0.0%	100.0%
C1B	Oil Seeds	DISTR PRODUCTOS DESHIDRATADOS	ZZ	QINGDAO	SHANDONG JUSTON CEREALS & OIL IND	CHINA P	18	0.0%	100.0%
							246,993	100.0%	

Table 3-22D
Mexico Scrap Import Shipper Consignee Detail
May-03

CONSIGNEE	CITY	FOREIGN PORT OF LOAD	SHIPPER	COUNTRY OF SHIPPER	Metric tons	Perc	Cumulative Percentage
TUBOS DE ACERO MEXICO	VERACRUZ	NEW YORK	NAPORANO IRON & METALS	NJ	32,466	52.4%	52.4%
METALOGICS	LAREDO	TAMPA	HUGO NEU SCHNITZER	NY	27,055	43.7%	96.1%
DEACERO	GARZA GARCIA	MARIEL	DESEQUIP EXPORTS & IMPORTS	CUBA	1,795	2.9%	99.0%
ORDER OF SHIPPER	ZZ	CARTAGENA CL	ORDER OF SHIPPER	ZZ	130	0.2%	99.2%
ORDER OF SHIPPER	ZZ	BUSAN	ORDER OF SHIPPER	ZZ	94	0.2%	99.3%
AMI TRDG	MIAMI	CARTAGENA CL	C I MUNDO METAL	COLOMB	57	0.1%	99.4%
ORDER OF SHIPPER	ZZ	BARCELONA SP	ORDER OF SHIPPER	ZZ	52	0.1%	99.5%
NEMAK	GARZA GARCIA	BUENAVENTURA	PACIFIC METALS	CANADA	50	0.1%	99.6%
UNION TRADE	GUADALAJARA	PUNTA MANZANI	RECICLADORA CENTROAMERICANA	PANAMA	45	0.1%	99.7%
NEMAK	GARZA GARCIA	SAN JUAN PR	TEXEL AMERICA	PR	39	0.1%	99.7%
NEMAK	GARZA GARCIA	PTO CABELLO	AMI TRDG	FL	38	0.1%	99.8%
NEMAK	GARZA GARCIA	SAN SALVAD ES	AMI TRDG	FL	27	0.0%	99.8%
CALPORT RESOURCES	LOS ANGELES	SYDNEY AU	ORDER OF SHIPPER	ZZ	25	0.0%	99.9%
ORDER OF SHIPPER	ZZ	PUNTA MANZANI	ORDER OF SHIPPER	ZZ	23	0.0%	99.9%
SHANGHAI SIGMA METALS	SHANGHAI	CALLAO	GREAT VENTURE	ZZ	22	0.0%	99.9%
NEMAK	GARZA GARCIA	PORT OF SPAIN	TRINBRONZE ENTERPRISES	TRINID	21	0.0%	100.0%
NEMAK	GARZA GARCIA	SAN JUAN PR	AMI TRDG	FL	20	0.0%	100.0%
					61,958	100.0%	

Table 3-22E
Mexico Fertilizer Import Shipper Consignee Detail
May-03

CITY	FOREIGN PORT OF LOAD	SHIPPER	COUNTRY OF SHIPPER	Metric tons	Perc	Cumulative Percentage
ZAPOPAN	TAMPA	U S CHEM RESOURCES	ZZ	21,997	17.9%	17.9%
TOLUCA	YUZHNYY	INTERPROFIT TWO THOUSAND KFT	ZZ	19,900	16.2%	34.1%
ZZ	MARSA EL BREG	NATIONAL OIL	ZZ	13,500	11.0%	45.0%
QUERETARO	ST PETERSBURG	WITTRACO DUNGEMITTEL	GERMANY	12,500	10.2%	55.2%
QUERETARO	TAMPA	CARGILL	FL	11,498	9.3%	64.5%
VERACRUZ	MARSA EL BREG	NATIONAL OIL	ZZ	9,994	8.1%	72.7%
VERACRUZ	MARSA EL BREG	NATIONAL OIL	ZZ	9,798	8.0%	80.6%
TOLUCA	YUZHNYY	IBE KERESKENDELMI ES SZOLGALTATO	ZZ	5,500	4.5%	85.1%
TLAJOMULCO DE	AMBERES	HYDRO AGRI	FRANCE	4,911	4.0%	89.1%
VERACRUZ	BEAUMONT	IMC GLOBAL OPERATIONS	ZZ	3,200	2.6%	91.7%
MEXICO	BEAUMONT	IMC GLOBAL OPERATIONS	ZZ	3,100	2.5%	94.2%
MEXICO	MARSA EL BREG	NATIONAL OIL	ZZ	3,070	2.5%	96.7%
ZAPOPAN	IQUIQUE	COSAYACH NITRATOS	CHILE	1,010	0.8%	97.5%
MEXICO	LIVERPOOL UK	MAGNA CHARTER LINE	ZZ	511	0.4%	98.0%
MEXICO	PORT OF SPAIN	H I CHEM	ZZ	305	0.2%	98.2%
MEXICO	SN ANTONIO CH	A M BROOM	ZZ	294	0.2%	98.4%
ZZ	DURBAN	ORDER OF SHIPPER	ZZ	236	0.2%	98.6%
ZZ	JAKARTA	ORDER OF SHIPPER	ZZ	147	0.1%	98.8%
ZZ	SANTOS	DOW CHEMICAL	BRAZIL	100	0.1%	98.8%
ZZ	HAIFA	AGAN CHEMICAL MFG	ISRAEL	93	0.1%	98.9%
MEXICO	THAMESPORT	EAGLE GLOBAL LOGISTICS	ZZ	74	0.1%	99.0%
VERACRUZ	HAIFA	AGAN CHEMICAL MFG	ISRAEL	62	0.1%	99.0%
MEXICO	SHANGHAI	PANDA INTL TRANSPORTATION	ZZ	55	0.0%	99.1%
MANZANILLO	SHANGHAI	HANDELSGESELLSCHAFT DETLEF VON APPE	GERMANY	50	0.0%	99.1%
ZZ	BARRANQUILLA	ORDER OF SHIPPER	ZZ	46	0.0%	99.1%
MEXICO	PTO CABELLO	PROYEFA	VENEZ	43	0.0%	99.2%
TLAQUEPAQUE	HONG KONG	CHOSERIGHT	HG KONG	42	0.0%	99.2%
MANZANILLO	SINGAPUR	HANDELSGESELLSCHAFT	GERMANY	42	0.0%	99.2%
TLALNEPANTLA	SINGAPUR	GLOBE CHEMICALS	GERMANY	41	0.0%	99.3%
ZZ	AMBERES	ORDER OF SHIPPER	ZZ	40	0.0%	99.3%
ALAJUELA	SHANGHAI	ETERNITY INTL	ZZ	40	0.0%	99.3%
ZZ	MALTA	ORDER OF SHIPPER	ZZ	38	0.0%	99.4%
TLALNEPANTLA	SINGAPUR	GLOBE CHEMICALS	GERMANY	37	0.0%	99.4%
TLALNEPANTLA	TIANJIN	GLOBE CHEMICALS	GERMANY	37	0.0%	99.4%
VERACRUZ	HAIFA	AGAN CHEMICAL MFG	ISRAEL	36	0.0%	99.5%
MANZANILLO	SHANGHAI	HANDELSGESELLSCHAFT DETLEF VON APPE	GERMANY	34	0.0%	99.5%
MANZANILLO	SHANGHAI	HANDELSGESELLSCHAFT DETLEF VON APPE	ZZ	34	0.0%	99.5%
ZZ	SINGAPUR	OSPL	SINGAPR	34	0.0%	99.5%
LOS MOCHIS	BARCELONA SP	AGROQUIMICOS	SPAIN	31	0.0%	99.6%
MEXICO	BARCELONA SP	DEGUSSA	SPAIN	22	0.0%	99.6%
MEXICO	DALIAN	ETERNITY INTL	ZZ	22	0.0%	99.6%
ZZ	HSINKANG	LIAONING HENGYI FOREIGN TRADE	ZZ	22	0.0%	99.6%
AUTLAN	IQUIQUE	COSAYACH NITRATOS	CHILE	22	0.0%	99.6%
MANZANILLO	SINGAPUR	HANDELSGESELLSCHAFT DETLEF VON APPE	GERMANY	21	0.0%	99.7%
ALTAMIRA	MAENTYLUDTO	KEMIRA SPECIALTY CROP CARE	HOLANDA	21	0.0%	99.7%
ZZ	BARCELONA SP	ORDER OF SHIPPER	ZZ	20	0.0%	99.7%
NAUCALPAN	HSINKANG	SINOCHEM	CHINA P	20	0.0%	99.7%
ZZ	KEELUNG	SINON	ZZ	19	0.0%	99.7%
MEXICALI	KEELUNG	CAMFALL	ZZ	19	0.0%	99.7%
MEXICALI	KEELUNG	CAMFAIL	ZZ	19	0.0%	99.8%
MEXICO	SHANGHAI	YICHENG LOGISTICS	ZZ	19	0.0%	99.8%
ZZ	KEELUNG	ORDER OF SHIPPER	ZZ	18	0.0%	99.8%
MEXICO	KOBE	BAYER	JAPON	18	0.0%	99.8%
TLAQUEPAQUE	SINGAPUR	PETROSIDA GRESIK	INDNSIA	17	0.0%	99.8%
MEXICO	SHANGHAI	SHANGHAI INTERUNITED	ZZ	17	0.0%	99.8%
MANZANILLO	SHANGHAI	ORDER OF SHIPPER	ZZ	17	0.0%	99.8%
MEXICO	JAWAHARLAL NE	BARWIL FORBES SHPG SERVICE	ZZ	16	0.0%	99.9%
VERACRUZ	HAIFA	MAKHTESHIM CHEMICAL WORKS	ISRAEL	15	0.0%	99.9%
YUMA	KEELUNG	SINON	CHINA T	15	0.0%	99.9%
MONTERREY	HONG KONG	F S INTL FWDG	ZZ	14	0.0%	99.9%
ZZ	VALENCIA SP	DOW CHEMICAL	SPAIN	13	0.0%	99.9%
TETLA	VALENCIA SP	DOW CHEMICAL	SPAIN	13	0.0%	99.9%
QUERETARO	HAMBURGO	MAR MAC	FL	12	0.0%	99.9%
CIUDAD DE GUA	SHANGHAI	BIESTERFELD	NY	12	0.0%	99.9%
TLAQUEPAQUE	BANGKOK	LINKFORWARD TRDG	THAILND	12	0.0%	99.9%
ZZ	THAMESPORT	ORDER OF SHIPPER	ZZ	12	0.0%	100.0%
TAMPICO	HAIFA	MAKHTESHIM CHEMICAL WORKS	ISRAEL	12	0.0%	100.0%
ZZ	SHANGHAI	ORDER OF SHIPPER	ZZ	11	0.0%	100.0%
VERACRUZ	HAIFA	AGAN AROMA	ISRAEL	10	0.0%	100.0%
VERACRUZ	HAIFA	AGAN CHEMICAL MFG	ISRAEL	10	0.0%	100.0%
MEXICO	DURBAN	VOLCANO AGROSCIENCE	ZZ	6	0.0%	100.0%
ECATEPEC DE M	HONG KONG	HENFORD SHPG	ZZ	5	0.0%	100.0%
ZZ	BUENOS AIR AG	ORDER OF SHIPPER	ZZ	4	0.0%	100.0%
ZZ	HAMBURGO	ORDER OF SHIPPER	ZZ	4	0.0%	100.0%
				123,006	100.0%	

Table 3-22F
Mexico Auto Export Shipper Consignee Detail
May-03

WEFA77NAME	DESTINATION COUNTRY	CONSIGNEE	COUNTRY OF CONSIGNEE	FOREIGN PORT	SHIPPER	CITY	Metric tons	Perc	Cumulative Percentage
Motor Vehicles	ALEMANIA	ORDER OF SHIPPER	ZZ	EMDEN	ORDER OF SHIPPER	ZZ	3,871	17.8%	17.8%
Motor Vehicles	ESTADOS UNIDOS	ORDER OF SHIPPER	ZZ	JACKSONVILLE	G M	MEXICO	2,570	11.8%	29.6%
Motor Vehicles	ESTADOS UNIDOS	ORDER OF SHIPPER	ZZ	WILMINGTON DE	ORDER OF SHIPPER	ZZ	2,451	11.3%	40.9%
Motor Vehicles	BELGICA	ORDER OF SHIPPER	ZZ	ZEEBRUGGE	DAIMLER CHRYSLER	TOLUCA	2,006	9.2%	50.1%
Motor Vehicles	ESTADOS UNIDOS	ORDER OF SHIPPER	ZZ	BRUNSWICK	ORDER OF SHIPPER	ZZ	1,446	6.6%	56.7%
Motor Vehicles	ESTADOS UNIDOS	ORDER OF SHIPPER	ZZ	TAMPA	DAIMLER CHRYSLER	TOLUCA	1,239	5.7%	62.4%
Motor Vehicles	ESTADOS UNIDOS	ORDER OF SHIPPER	ZZ	TAMPA	ORDER OF SHIPPER	ZZ	1,231	5.7%	68.1%
Motor Vehicles	BRASIL	ST GOBAIN DES JONQUERES	MOR	RIO D JANEIRO	ST GOBAIN DES JONQUERES	AACHEN	927	4.3%	72.3%
Motor Vehicles	JAPON	ORDER OF SHIPPER	ZZ	TOYOHASHI	ORDER OF SHIPPER	ZZ	798	3.7%	76.0%
Motor Vehicles	ESTADOS UNIDOS	ST GOBAIN GLASS	MX	BALTIMORE	ST GOBAIN DES JONQUERES	AACHEN	759	3.5%	79.5%
Motor Vehicles	ESTADOS UNIDOS	ORDER OF SHIPPER	ZZ	BALTIMORE	NISSAN MEXICANA	MEXICO	620	2.9%	82.3%
Motor Vehicles	CANADA	GENERAL MOTORS	CAYMAN	GEORGETOWN CN	GENERAL MOTORS	SILAO	602	2.8%	85.1%
Motor Vehicles	ESTADOS UNIDOS	ORDER OF SHIPPER	ZZ	PENSACOLA	ORDER OF SHIPPER	ZZ	502	2.3%	87.4%
Motor Vehicles	ITALIA	ORDER OF SHIPPER	ZZ	SAVONA	DAIMLER CHRYSLER	MEXICO	403	1.9%	89.3%
Motor Vehicles	COLOMBIA	ORDER OF SHIPPER	ZZ	BUENAVENTURA	LINEA MARITIMA MEXICANA	MEXICO	389	1.8%	91.0%
Motor Vehicles	JAPON	ORDER OF SHIPPER	ZZ	TOYOHASHI	DAIMLER CHRYSLER	MEXICO	279	1.3%	92.3%
Motor Vehicles	ESTADOS UNIDOS	ORDER OF SHIPPER	ZZ	JACKSONVILLE	DAIMLER CHRYSLER	TOLUCA	239	1.1%	93.4%
Motor Vehicles	CHILE	NISSAN MARUBENI	CHILE	SN ANTONIO CH	VOLKSWAGEN	PUEBLA	177	0.8%	94.2%
Motor Vehicles	CHILE	MACO INTL	CHILE	VALPARAISO	CAMIONES & MOTORES INTL	MEXICO	166	0.8%	95.0%
Motor Vehicles	PANAMA	PANAMENA DE MOTORES	PANAMA	BALBOA	NISSAN MEXICANA	MEXICO	164	0.8%	95.8%
Motor Vehicles	ESTADOS UNIDOS	ORDER OF SHIPPER	ZZ	JACKSONVILLE	NISSAN MEXICANA	MEXICO	143	0.7%	96.4%
Motor Vehicles	ECUADOR	AUTOMOTORES & ANEXOS	ZZ	MANTA	NISSAN MEXICANA	MEXICO	117	0.5%	96.9%
Motor Vehicles	ESPANA	ORDER OF SHIPPER	ZZ	SANTANDER SP	DAIMLER CHRYSLER	MEXICO	110	0.5%	97.5%
Motor Vehicles	N ANTIL	GENERAL MOTORS	CAYMAN	ORANJESTAD	GENERAL MOTORS	ZZ	106	0.5%	97.9%
Motor Vehicles	EL SALVADOR	GRUPO Q	EL SALV	ACAJUTLA	NISSAN MEXICANA	MEXICO	102	0.5%	98.4%
Motor Vehicles	COSTA RICA	GENERAL MOTORS	CAYMAN	PUERTO LIMON	GENERAL MOTORS	ZZ	90	0.4%	98.8%
Motor Vehicles	GUATEMALA	ORDER OF SHIPPER	ZZ	QUETZAL	ORDER OF SHIPPER	ZZ	88	0.4%	99.2%
Motor Vehicles	PERU	NISSAN MAQUINARIAS	PERU	CALLAO	NISSAN MEXICANA	MEXICO	88	0.4%	99.6%
Motor Vehicles	ESTADOS UNIDOS	ORDER OF SHIPPER	ZZ	BALTIMORE	DAIMLER CHRYSLER	TOLUCA	81	0.4%	100.0%
							21,764		
							0	0.0%	
							21,764		

NOTE: See below for EMDEN detail - carriers etc.

VOYAGE	SHIP LINE	SLINENAME	HARMONIZED CO	COMMODITY	VDATE	Metric tons
8	VAGT	VAG TRANSPORT	870390	VOLKSWAGEN	3/5/2018	1,817
59	VAGT	VAG TRANSPORT	870490	CHEVROLET PICK UP	3/5/2008	2
59	VAGT	VAG TRANSPORT	870390	VOLKSWAGEN	3/5/2008	2,052

Table 3-22G
Mexico Iron and Steel Import Shipper Consignee Detail
May-03

WEFA77CODE	WEFA77NAME	CONSIGNEE	CITY	FOREIGN PORT OF LOAD	SHIPPER	COUNTRY OF SHIPPER	Metric tons	Perc	Cumulative Percentage
C371	Iron and Steel	THYSSENKRUPP MEXINOX	SAN LUIS POTO	CIVITAVECCHIA	THYSSENKRUPP STEEL	GERMANY	8,574	6.4%	6.4%
C371	Iron and Steel	LAGERMAX	PUEBLA	AMBERES	THYSSEN KRUPP STAHLUNION	GERMANY	8,334	6.2%	12.5%
C371	Iron and Steel	MEXINOX TRDG	ZZ	CIVITAVECCHIA	ORDER OF SHIPPER	ZZ	6,320	4.7%	17.2%
C371	Iron and Steel	FERRE BARNIEDO	ECATEPEC DE M	PASAGES	ORDER OF SHIPPER	ZZ	5,138	3.8%	21.0%
C371	Iron and Steel	ACEROS COREY	GUADALAJARA	PASAGES	ORDER OF SHIPPER	ZZ	4,621	3.4%	24.5%
C371	Iron and Steel	CASA HOMS	VERACRUZ	RIO D JANEIRO	SIDERURGICA NACIONAL	ZZ	4,321	3.2%	27.7%
C371	Iron and Steel	TUBOS DE ACERO MEXICO	VERACRUZ	CAMPANA	SIDERCA SAIC	ARGENT	4,112	3.0%	30.7%
C371	Iron and Steel	MERITOR	SAN LUIS POTO	PRAIA MOLE	USINAS SID MINAS GERAIS USIMINAS	BRAZIL	3,923	2.9%	33.6%
C371	Iron and Steel	CONSERVAS LA COSTENA	TULPETLAC	NAGOYA	MCSK	ZZ	3,515	2.6%	36.2%
C371	Iron and Steel	SOCIETE GENERAL NEW YORK BRANCH	NEW YORK	RIO D JANEIRO	SIDERURGICA NACIONAL	ZZ	3,364	2.5%	38.7%
C371	Iron and Steel	LMN MARKETING FZE	DUBAI	BOULOGNE FR	COULOG	FRANCE	3,300	2.4%	41.2%
C371	Iron and Steel	ABINSA	SAN NICOLAS D	PASAGES	ORDER OF SHIPPER	ZZ	2,858	2.1%	43.3%
C371	Iron and Steel	TRANSUNISA	TUXPAN	RIO D JANEIRO	ACOS VILLARES	BRAZIL	2,764	2.0%	45.3%
C371	Iron and Steel	BOTEMEX	XALOSTOC	AMBERES	ARACELOR PACKAGING INTL	FRANCE	2,189	1.6%	47.0%
C371	Iron and Steel	VALENTIN HOMS	VERACRUZ	PASAGES	ACERALIA PERFILES	SPAIN	2,134	1.6%	48.5%
C371	Iron and Steel	GRUPO COLLADO	MEXICO	PASAGES	ACERALIA PERFILES	SPAIN	2,100	1.6%	50.1%
C371	Iron and Steel	GALVAK	SAN NICOLAS D	KWANGYANG	HYOSUNG	KOR REP	2,020	1.5%	51.6%
C371	Iron and Steel	FABRICAS MONTERREY	MONTERREY	AMBERES	ORDER OF SHIPPER	ZZ	2,017	1.5%	53.1%
C371	Iron and Steel	SEVILAMINA SUMMIT	QUERETARO	YAWATA	SUMITOMO	ZZ	1,765	1.3%	54.4%
C371	Iron and Steel	VILLASANA	MANZANILLO	YAWATA	MARUBENI ITOCHU STEEL	ZZ	1,753	1.3%	55.7%
C371	Iron and Steel	FORTACERO	APODACA	PASAGES	ORDER OF SHIPPER	ZZ	1,662	1.2%	56.9%
C371	Iron and Steel	VOLKSWAGEN	ZZ	FUKUYAMA	MARUBENI ITOCHU STEEL	ZZ	1,601	1.2%	58.1%
C371	Iron and Steel	HERRAMIENTAS TRUPER	JILOTEPEC	KWANGYANG	DAEWOO INTL	KOR REP	1,523	1.1%	59.3%
C371	Iron and Steel	ISPAT	LAZARO CARDEN	SHANGHAI	BAO STEEL IMPORTS & EXPORTS	ZZ	1,434	1.1%	60.3%
C371	Iron and Steel	ORDER OF SHIPPER	ZZ	BREMERHAVEN	ORDER OF SHIPPER	ZZ	1,426	1.1%	61.4%
C371	Iron and Steel	CALENTADORES CINSA	ZZ	GHENT	ORDER OF SHIPPER	ZZ	1,389	1.0%	62.4%
C371	Iron and Steel	IND METALICA DEL ENVASE	HUEHUETOCA	FUKUYAMA	MARUBENI ITOCHU STEEL	ZZ	1,301	1.0%	63.4%
C371	Iron and Steel	ENVASES & TAPAS MODELO	ZACATECAS	YAWATA	MARUBENI ITOCHU STEEL	ZZ	1,282	1.0%	64.3%
C371	Iron and Steel	SEVILAMINA SUMMIT	BENITO JUAREZ	YAWATA	SUMITOMO	ZZ	1,269	0.9%	65.3%
C371	Iron and Steel	ENVASES & TAPAS MODELO	CALERA VICTOR	YAWATA	MARUBENI ITOCHU STEEL	ZZ	1,166	0.9%	66.1%
C371	Iron and Steel	CONSERVAS LA COSTENA	TULPETLAC	YAWATA	NISSHO IWAI	ZZ	1,122	0.8%	67.0%
C371	Iron and Steel	SEVILAMINA SUMMIT	QUERETARO	KWANGYANG	DAEWOO INTL	KOR REP	1,109	0.8%	67.8%
C371	Iron and Steel	NISSAN MEXICANA	MEXICO	KIMITSU	NISSHO IWAI	JAPAN	1,078	0.8%	68.6%
C371	Iron and Steel	LAGERMAX	PUEBLA	AMBERES	THYSSEN	GERMANY	1,068	0.8%	69.4%
C371	Iron and Steel	GRUPO CARGOQUIM	MANZANILLO	KWANGYANG	DAEWOO INTL	KOR REP	984	0.7%	70.1%
C371	Iron and Steel	FORTACERO	APODACA	PASAGES	ACERALIA PERFILES	SPAIN	976	0.7%	70.8%
C371	Iron and Steel	ORDER OF SHIPPER	ZZ	AMBERES	ORDER OF SHIPPER	ZZ	928	0.7%	71.5%
C371	Iron and Steel	FORJAS METALICAS	ZZ	BILBAO	FERCONE TRDG	SPAIN	924	0.7%	72.2%
C371	Iron and Steel	THYSSENKRUPP STEEL	DETROIT	AMBERES	THYSSEN	GERMANY	884	0.7%	72.9%
C371	Iron and Steel	EMPRESA RIGA	CIENEGA DE FL	CAMPANA	SIDERCA SAIC	ARGENT	874	0.6%	73.5%
C371	Iron and Steel	MILCHORENA	ALTAMIRA	AMBERES	ARCELOR INTL AMERICA	NY	769	0.6%	74.1%
C371	Iron and Steel	MITSUBISHI INTL	ROSEMONT	YAWATA	MITSUBISHI INTL	IL	765	0.6%	74.6%
C371	Iron and Steel	MITSUI	SOUTHFIELD	KIMITSU	MITSUI	JAPAN	737	0.5%	75.2%
C371	Iron and Steel	MITSUBISHI INTL	ROSEMONT	YAWATA	MITSUBISHI	ZZ	734	0.5%	75.7%
C371	Iron and Steel	NESTLE	ZZ	RIO D JANEIRO	SIDERURGICA NACIONAL	ZZ	725	0.5%	76.3%
C371	Iron and Steel	CINSA	SALTILLO	GHENT	ORDER OF SHIPPER	ZZ	697	0.5%	76.8%
C371	Iron and Steel	ORDER OF SHIPPER	ZZ	LE HAVRE	ORDER OF SHIPPER	ZZ	646	0.5%	77.3%
C371	Iron and Steel	ZAPATA ENVASES	CUAUTITLAN	FUKUYAMA	MARUBENI ITOCHU STEEL	ZZ	614	0.5%	77.7%
C371	Iron and Steel	MABE SANYO COMPRESORES	SAN LUIS POTO	MIZUSHIMA	KANEMATSU GOSHO	JAPAN	527	0.4%	78.1%
C371	Iron and Steel	CONSTRUCCIONES METALICAS MEXICANAS	APASEO EL GRA	BILBAO	FERCONE TRDG	SPAIN	517	0.4%	78.5%
C371	Iron and Steel	GOMEZ SANUDO	VERACRUZ	BILBAO	TREFILERIAS QUIJANO	ESPANA	498	0.4%	78.9%
C371	Iron and Steel	ENVASES GENERALES CROWN	MEXICO	YAWATA	MITSUI	JAPAN	494	0.4%	79.2%
C371	Iron and Steel	TECHNO STEEL PRECESSING	APODACA	MIZUSHIMA	TOYOTA TSUSHO	JAPAN	490	0.4%	79.6%
C371	Iron and Steel	FLEX N GATE	SAN JOSE ITUR	KWANGYANG	DAEWOO INTL	KOR REP	441	0.3%	79.9%
C371	Iron and Steel	ENRIQUE RAMOS	ZZ	KWANGYANG	HYOSUNG	KOR REP	441	0.3%	80.2%
							108,217	80.2%	
							26,643	19.8%	19.8%
							134,860	100.0%	

Table 3-22H
Mexico Iron and Steel Export Shipper Consignee Detail
May-03

WEFA77CODE	WEFA77NAME	DESTINATION COUNTRY	CONSIGNEE	COUNTRY OF CONSIGNEE	FOREIGN PORT	SHIPPER	CITY	Metric tons	Perc	Cumulative Percentage
C371	Iron and Steel	CANADA	TREE ISLAND IND	ZZ	NEW WESTMINST	SIDERURGICA LAZARO CARDEN TRUCHAS	MONTERREY	50,176	45.3%	45.3%
C371	Iron and Steel	CANADA	FERROSTAAL	CA	NEW WESTMINST	SIDERURGICA LAZARO CARDEN TRUCHAS	MONTERREY	13,776	12.4%	57.8%
C371	Iron and Steel	ESTADOS UNIDOS	SIDERCA	TX	HOUSTON	TUBOS DE ACERO MEXICO	VERACRUZ	9,286	8.4%	66.2%
C371	Iron and Steel	CANADA	ALGOMA TUBES	YO	ST JOHNS QU	TUBOS DE ACERO MEXICO	VERACRUZ	6,923	6.3%	72.4%
C371	Iron and Steel	COLOMBIA	ACERIAS DEL ECUADOR ADELCA	ZZ	BARRANQUILLA	SIDERURGICA LAZARO CARDEN TRUCHAS	MONTERREY	5,173	4.7%	77.1%
C371	Iron and Steel	COLOMBIA	SIDERURGICA DEL NORTE	COLOMB	BARRANQUILLA	SIDERURGICA LAZARO CARDEN TRUCHAS	MONTERREY	4,199	3.8%	80.9%
C371	Iron and Steel	CANADA	ALGOMA TUBES	YO	HALIFAX NS	TUBOS DE ACERO MEXICO	VERACRUZ	3,259	2.9%	83.8%
C371	Iron and Steel	COLOMBIA	FEDIACERO	COLOMB	CARTAGENA CL	ALTOS HORNOS DE MEXICO	MONCLOVA	2,235	2.0%	85.8%
C371	Iron and Steel	ITALIA	SOCOTHERM	ITALIA	RAVENNA	TUBOS DE ACERO MEXICO	VERACRUZ	1,950	1.8%	87.6%
C371	Iron and Steel	P RICO	IMSA	PR	SAN JUAN PR	IMSA	SAN NICOLAS D	769	0.7%	88.3%
C371	Iron and Steel	ESTADOS UNIDOS	ALGOMATUBES	YO	HOUSTON	TUBOS DE ACERO MEXICO	VERACRUZ	743	0.7%	89.0%
C371	Iron and Steel	CHINA P	ORDER OF SHIPPER	ZZ	HUANGPU	ORDER OF SHIPPER	ZZ	641	0.6%	89.5%
C371	Iron and Steel	COSTA RICA	IND MONTERREY	C RICA	PUERTO LIMON	IMSA	SAN NICOLAS D	588	0.5%	90.1%
C371	Iron and Steel	COSTA RICA	ATLAS IND	C RICA	PUERTO LIMON	IMSA	SAN NICOLAS D	567	0.5%	90.6%
C371	Iron and Steel	CANADA	HNS TUBULAR	CANADA	HALIFAX NS	PRINVER	VERACRUZ	559	0.5%	91.1%
C371	Iron and Steel	EGIPTO	BELAYIM PETROLEUM	EGIPTO	ALEXANDRIA EY	TUBOS DE ACERO MEXICO	VERACRUZ	431	0.4%	91.5%
C371	Iron and Steel	COLOMBIA	CORPAC STEEL PRODUCTS	FL	CARTAGENA CL	TUBERIAS PROCARSA	CD FRONTERA	380	0.3%	91.8%
C371	Iron and Steel	REP DOMINICANA	METROPOLITANA COMERCIAL	REP DOM	RIO HAINA	CANAM ROMSA DE MEXICO	CIENEGA DE FL	347	0.3%	92.1%
C371	Iron and Steel	ESTADOS UNIDOS	ORDER OF SHIPPER	ZZ	NEW ORLEANS	ORDER OF SHIPPER	ZZ	341	0.3%	92.4%
C371	Iron and Steel	ARGENTINA	SIDERCA SAIC	ARGENT	BUENOS AIR AG	TAMTRADE	MEXICO	292	0.3%	92.7%
C371	Iron and Steel	TAILANDIA	AWAJI SANGYO	TAILAND	BANGKOK	TAMTRADE	MEXICO	284	0.3%	93.0%
C371	Iron and Steel	CUBA	ORDER OF SHIPPER	ZZ	LA HABANA	ORDER OF SHIPPER	ZZ	277	0.3%	93.2%
C371	Iron and Steel	PERU	PLUSPETROL	PERU	IQUITOS	TAMTRADE	MEXICO	276	0.2%	93.5%
C371	Iron and Steel	ECUADOR	MABE	ECUADOR	GUAYAQUIL	APM	MONTERREY	275	0.2%	93.7%
C371	Iron and Steel	COSTA RICA	GALVACER	C RICA	PUERTO LIMON	GALVAK	SAN NICOLAS D	244	0.2%	93.9%
C371	Iron and Steel	PERU	ESTRUCTURAS IND EGA	PERU	CALLAO	IMSA	ZZ	217	0.2%	94.1%
C371	Iron and Steel	REP DOMINICANA	ORDER OF SHIPPER	ZZ	RIO HAINA	ORDER OF SHIPPER	ZZ	209	0.2%	94.3%
C371	Iron and Steel	PERU	CAMESA	PERU	CALLAO	ACEROS CAMESA	MEXICO	207	0.2%	94.5%
C371	Iron and Steel	SUDAFRICA	VAN LEEUWEN PIPE & TUBE	SUDAFRI	DURBAN	TAMTRADE	MEXICO	204	0.2%	94.7%
C371	Iron and Steel	COSTA RICA	HOLCIM	C RICA	PUERTO LIMON	SIDERURGICA LAZARO CARDEN TRUCHAS	LAZARO CARDEN	203	0.2%	94.9%
C371	Iron and Steel	CUBA	ORDER OF SHIPPER	ZZ	LA HABANA	AGENCIA NAVIERAS	ZZ	202	0.2%	95.0%
C371	Iron and Steel	CHILE	PROVEEDORA IND MINERA ANDINA	CHILE	SN ANTONIO CH	MINERA AUTLAN	GARZA GARCIA	200	0.2%	95.2%
C371	Iron and Steel	P RICO	SERVIMETAL	PR	SAN JUAN PR	IMSA	SAN NICOLAS D	197	0.2%	95.4%
C371	Iron and Steel	CHILE	GALVACER	ZZ	SN ANTONIO CH	GALVAK	SAN NICOLAS D	177	0.2%	95.6%
C371	Iron and Steel	PAKISTAN	SAC INTL STEEL	CA	KARACHI	IMSA	SAN NICOLAS D	165	0.1%	95.7%
C371	Iron and Steel	SUECIA	SKF COUPLING SYSTEMS	SUECIA	HOFORS	FRISA FORJADOS	SANTA CATARIN	145	0.1%	95.8%
C371	Iron and Steel	OMAN	SUPPLY	OMAN	PT SULTAN QAB	TAMTRADE	MEXICO	143	0.1%	96.0%
C371	Iron and Steel	CUBA	METALOG	CUBA	LA HABANA	DISTR AMASA	ZACATECAS	140	0.1%	96.1%
C371	Iron and Steel	JAMAICA	IMSA CARIBBEAN	P RICO	KINGSTON JA	IMSA	SAN NICOLAS D	126	0.1%	96.2%
C371	Iron and Steel	CHILE	GALVACER	ZZ	VALPARAISO	GALVAK	SAN NICOLAS D	123	0.1%	96.3%
C371	Iron and Steel	ITALIA	DALMINE	ITALIA	LA SPEZIA	TAMTRADE	MEXICO	118	0.1%	96.4%
C371	Iron and Steel	CHILE	GRUPO IMSA	CHILE	VALPARAISO	IMSA	ZZ	116	0.1%	96.5%
C371	Iron and Steel	P RICO	NU VUE IND	PR	SAN JUAN PR	IMSA	SAN NICOLAS D	112	0.1%	96.6%
C371	Iron and Steel	CHILE	EOYGE	CHILE	TALCAHUANO	ELECTROFORJADOS NACIONALES	QUERETARO	101	0.1%	96.7%
C371	Iron and Steel	INDIA	ROYAL GLOBAL	ZZ	MUMBAI	THYSSENKRUPP MEXINOX	SAN LUIS POTO	100	0.1%	96.8%
C371	Iron and Steel	HOLANDA	HASCOR	HOLANDA	ROTTERDAM	NITROCOR	TAMPICO	96	0.1%	96.9%
C371	Iron and Steel	CHILE	GOODYEAR	CHILE	VALPARAISO	ACEROS CAMESA	MEXICO	95	0.1%	97.0%
C371	Iron and Steel	P RICO	GENERAL ELECTRIC	PR	SAN JUAN PR	HYLSA DIVISION ACEROS TUBULARES	SAN NICOLAS D	92	0.1%	97.1%
C371	Iron and Steel	CUBA	EAST COAST TUBULARS	YA	LA HABANA	TAMTRADE	MEXICO	88	0.1%	97.2%
C371	Iron and Steel	CHILE	TICAL SHPG	PERU	VALPARAISO	NAVIODAMCO LINE	MEXICO	87	0.1%	97.2%
C371	Iron and Steel	ESTADOS UNIDOS	ITF	FL	TAMPA	TUBERIAS PROCARSA	CD FRONTERA	83	0.1%	97.3%
C371	Iron and Steel	INDIA	THYSSENKRUPP STEEL	ALEMANI	BOMBAY	THYSSENKRUPP MEXINOX	SAN LUIS POTO	81	0.1%	97.4%
C371	Iron and Steel	CUBA	METALOG	CUBA	LA HABANA	GALVAK	SAN NICOLAS D	77	0.1%	97.5%
C371	Iron and Steel	ESTADOS UNIDOS	ALGOMA STEEL	YO	HOUSTON	TUBOS DE ACERO MEXICO	VERACRUZ	74	0.1%	97.5%
C371	Iron and Steel	FR P IS	ORDER OF SHIPPER	ZZ	PAPEETE	EXPORTS DE MOSTOS & VINOS JUCOS	SANTIAGO	71	0.1%	97.6%
C371	Iron and Steel	SUECIA	SKF SVERIGE	SUECIA	GOTHENBURG	FRISA FORJADOS	SANTA CATARIN	69	0.1%	97.6%
C371	Iron and Steel	P RICO	SUNBELT GROUP	TX	SAN JUAN PR	HYLSA DIVISION ACEROS TUBULARES	SAN NICOLAS D	69	0.1%	97.7%
C371	Iron and Steel	HONG KONG	HASCOR	HG KONG	HONG KONG	NITROCOR	TAMPICO	63	0.1%	97.8%
C371	Iron and Steel	CHILE	A J BROOM	CHILE	VALPARAISO	TRANSOCEANICA DE CONTENEDORES	GUADALAJARA	61	0.1%	97.8%
C371	Iron and Steel	BELGICA	STEEL INVEST BVBA	BELGICA	AMBERES	SIDERURGICA	GUADALAJARA	60	0.1%	97.9%
C371	Iron and Steel	ECUADOR	INDURAMA	ZZ	GUAYAQUIL	GALVAK	SAN NICOLAS D	59	0.1%	97.9%
C371	Iron and Steel	PANAMA	HERRERIA SANTIAGO	PANAMA	PUNTA MANZANI	IMSA	SAN NICOLAS D	57	0.1%	98.0%
								108,477		

3.3 *Adjusted Forecast - Cargo and Calls*

This section includes the calculation of the adjusted base forecast for cargo tons and the probable and optimum scenarios. Also included are analyses of the vessel types and sizes, vessel calls, ballast calls and projection of the adjusted calls and vessel calls for the probable and optimum scenarios.

The adjustments for the missing JoC tons and the adjustment for the container tare weights and empties are also shown in the tables. Based on these adjustments, the remaining portions of the tables are calculated.

In the subsequent sections, adjustments for ballast calls and shifts of grain to larger bulk vessels and containerized cargo to larger containerships for the probable and optimistic forecast are also included. While most ballast calls are in the export direction, for the smaller container ships and other small vessels in the regional trades, the export trade exceeds imports and import ballast calls are included for those markets.

3.3.1 Adjusted Base Forecast

The following Table 3-23 calculates the adjusted base forecast. The adjusted base forecast revises the base forecast to account for the trade not included in the JoC data. The adjustments range between 1% and 14.5% for non container imports and between 4% and 50% for non container exports. For container tons the adjustments have been calibrated to 23.5% for exports and 14.5% for imports. As noted, part of the missing cargo in JoC appears to be missing vessel calls and/or missing manifests which could result from some non reporting by the smaller vessels and vessel operators especially in the regional export trade. In addition, portions of the reported bulk cargo and fluids are carried on general cargo vessels which makes exact alignment of both cargo types and vessel types difficult to achieve. The adjustments for container tare and empties are 50% for exports and 25% for imports.

The two tables that follow the adjusted base forecast calculate the probable and optimistic tonnage forecasts. The probable forecast scenario includes growth rates for bulk at 5% (which is double the base forecast but below the previous probable forecast CAGR) and 6% for container which approximates the overall forecast growth rate for Mexico container trade. The optimistic forecast scenario employs growth rates 50% higher than the probable forecast. Bulk cargos are projected at 7.5% and container at 9.0%. For both trades these growth rates are approximately three times the base forecast growth rates.

The bulk forecast adjustments to 5% and 7.5% are based on forecasts by the US Department of Agriculture (USDA) of Mexico grain imports, the shipper interviews, the recent strong growth of grain in the Port of Veracruz, and the cost competitiveness of larger bulk vessels relative to rail routings. (Without larger vessels, rail routings have become more competitive.) The container forecast adjustments to 6% and 9% are based on the forecast growth of total Mexico container trade, Global Insight economic growth forecasts for Mexico and the recent strong performance of the Port of Veracruz in the container trades. In addition, the recent free trade agreements with Europe and Latin America are expected to support stronger growth in the Port of Veracruz. Finally, as noted earlier, shipper/consignee and carrier interviews were conducted and provide support for higher adjusted growth rates. The growth rates for other cargo types beside bulk and container have also been increased by 12.5% for the probable forecast and 25% for the optimistic forecast.

The previous forecasts for 2025 (Development Plan for Port of Veracruz, prepared for APIVER by INOPESA, 2000) were 39.1 million tons (low forecast), 61.6 million tons (probable forecast) and 101.5 million tons (optimistic forecast). The current adjusted total forecasts for 2025 are 33.5 million tons, 50.0 million tons, 84.9 million tons, respectively. The current adjusted total forecasts are 14.3 to 18.9% below the previous forecasts in 2025.

Additional detailed analysis of the comparisons between the current forecasts and the previous forecast are included in Table 3-35. For the base forecast the difference in the bulk grain forecast is more than the total difference while the current container forecast is higher. For the probable forecast the difference is essentially the difference in the bulk grain forecast. For the optimistic forecast the difference is approximately half bulk grain and other cargo and half container.

Table 3-23
Adjusted Base Forecast by Vessel Type

	Adjustments									
	Adj. for JoC	Cont. Adj.	Total Adj.							
Export Container Tons										
VesselGroup				2002	2005	2010	2015	2020	2025	CAGR02to25
BULK	23.5%	50.0%	1.85	2,161	2,476	3,305	4,332	5,579	7,225	5.4%
CARCARRIER	23.5%	50.0%	1.85	501	543	699	882	1,103	1,387	4.5%
CONTAINER	23.5%	50.0%	1.85	1,558,037	1,755,325	2,216,486	2,748,389	3,380,049	4,188,000	4.4%
GENERALCARGO	23.5%	50.0%	1.85	143,460	160,005	204,136	257,914	322,633	407,053	4.6%
OTHER	23.5%	50.0%	1.85	165	180	226	296	388	514	5.1%
RORO	23.5%	50.0%	1.85	20,020	21,287	27,658	35,455	45,057	57,629	4.7%
UNKNOWN	23.5%	50.0%	1.85	666	744	921	1,145	1,412	1,750	4.3%
				1,725,009	1,940,561	2,453,431	3,048,415	3,756,221	4,663,559	4.4%
Export NonContainer Tons										
VesselGroup				2002	2005	2010	2015	2020	2025	CAGR01to25
BULK	33.0%	0.0%	1.33	110,165	107,787	113,080	119,453	125,149	131,326	0.8%
CARCARRIER	33.0%	0.0%	1.33	287,973	342,993	441,607	545,703	666,033	813,934	4.6%
CONTAINER	33.0%	0.0%	1.33	8,743	8,991	10,621	12,562	14,889	17,837	3.1%
GENERALCARGO	50.0%	0.0%	1.50	577,518	562,990	588,785	616,249	639,053	664,673	0.6%
OTHER	50.0%	0.0%	1.50	4,635	4,752	5,746	6,811	8,017	9,539	3.2%
PRODUCT	4.0%	0.0%	1.04	1,173	1,113	1,151	1,180	1,197	1,214	0.1%
RORO	50.0%	0.0%	1.50	9,817	11,030	13,481	16,346	19,858	24,403	4.0%
TANKER	4.0%	0.0%	1.04	94,922	99,927	110,454	122,414	134,478	148,258	2.0%
UNKNOWN	50.0%	0.0%	1.50	14,031	13,563	14,559	15,691	16,766	17,971	1.1%
				1,108,977	1,153,146	1,299,483	1,456,409	1,625,439	1,829,155	2.2%
Import Container Tons										
VesselGroup				2002	2005	2010	2015	2020	2025	CAGR02to25
BULK	14.5%	25.0%	1.43	13,445	16,935	28,448	47,276	76,128	124,127	10.1%
CARCARRIER	14.5%	25.0%	1.43	2,774	3,154	4,162	5,393	6,727	8,424	4.9%
CONTAINER	14.5%	25.0%	1.43	3,072,246	3,391,264	4,364,320	5,469,973	6,663,682	8,186,569	4.4%
GENERALCARGO	14.5%	25.0%	1.43	186,805	209,240	273,884	346,350	425,566	526,960	4.6%
OTHER	14.5%	25.0%	1.43	1,141	1,263	1,679	2,238	2,941	3,914	5.5%
RORO	14.5%	25.0%	1.43	30,888	34,415	44,490	57,606	69,687	85,092	4.5%
UNKNOWN	14.5%	25.0%	1.43	3,694	4,142	5,370	6,863	8,544	10,687	4.7%
				3,310,992	3,660,412	4,722,353	5,935,698	7,253,276	8,945,774	4.4%
Import NonContainer Tons										
VesselGroup				2002	2005	2010	2015	2020	2025	CAGR02to25
BULK	14.5%	0.0%	1.15	7,647,380	8,291,823	9,519,207	10,743,812	11,878,646	13,200,570	2.4%
CARCARRIER	6.5%	0.0%	1.07	276,347	283,395	329,328	385,326	442,553	510,134	2.7%
CONTAINER	6.5%	0.0%	1.07	77,044	85,918	103,990	122,363	139,407	159,087	3.2%
GENERALCARGO	2.5%	0.0%	1.03	1,245,013	1,305,681	1,499,107	1,722,232	1,948,381	2,229,316	2.6%
OTHER	2.5%	0.0%	1.03	4,604	4,449	4,744	5,390	6,027	6,749	1.7%
PRODUCT	1.0%	0.0%	1.01	193,024	213,765	257,503	301,833	344,633	394,389	3.2%
RORO	2.5%	0.0%	1.03	66,843	71,522	86,582	105,261	125,287	150,015	3.6%
TANKER	1.0%	0.0%	1.01	641,180	715,200	878,423	1,046,851	1,207,411	1,395,555	3.4%
UNKNOWN	2.5%	0.0%	1.03	9,751	10,411	11,508	12,526	13,401	14,370	1.7%
				10,161,187	10,982,164	12,690,391	14,445,593	16,105,746	18,060,186	2.5%
				2002	2005	2010	2015	2020	2025	CAGR02to25
Total Container				5,036,001	5,600,973	7,175,784	8,984,113	11,009,497	13,609,333	4.4%
Total NonContainer				11,270,164	12,135,310	13,989,875	15,902,002	17,731,185	19,889,341	2.5%
Total				16,306,165	17,736,283	21,165,659	24,886,115	28,740,682	33,498,674	3.2%

Table 3-24
Adjusted Base Forecast by Vessel Type - Probable

	BaseAdj.								Adjusted CAGR
Export Container Tons									
VesselGroup		2002	2005	2010	2015	2020	2025	CAGR02to25	1.125
BULK	1.85	2,161	2,578	3,460	4,644	6,233	8,365	6.1%	6.1%
CARCARRIER	1.85	501	581	745	956	1,225	1,571	5.1%	5.1%
CONTAINER	1.85	1,558,037	1,860,903	2,502,077	3,364,168	4,523,292	6,081,791	6.1%	6.1%
GENERALCARGO	1.85	143,460	167,112	215,510	277,926	358,417	462,220	5.2%	5.2%
OTHER	1.85	165	195	257	339	447	590	5.7%	5.7%
RORO	1.85	20,020	23,370	30,244	39,140	50,653	65,552	5.3%	5.3%
UNKNOWN	1.85	666	767	971	1,229	1,556	1,970	4.8%	4.8%
		1,725,009	2,055,506	2,753,265	3,688,401	4,941,822	6,622,059	6.0%	
Export NonContainer Tons									
VesselGroup		2002	2005	2010	2015	2020	2025	CAGR01to25	
BULK	1.33	110,165	113,041	118,002	123,181	128,586	134,229	0.9%	0.9%
CARCARRIER	1.33	287,973	335,261	431,950	556,525	717,028	923,819	5.2%	5.2%
CONTAINER	1.33	8,743	9,706	11,551	13,746	16,360	19,469	3.5%	3.5%
GENERALCARGO	1.50	577,518	589,548	610,158	631,489	653,566	676,414	0.7%	0.7%
OTHER	1.50	4,635	5,152	6,144	7,328	8,740	10,424	3.6%	3.6%
PRODUCT	1.04	1,173	1,179	1,189	1,199	1,209	1,219	0.2%	0.2%
RORO	1.50	9,817	11,216	14,007	17,491	21,843	27,277	4.5%	4.5%
TANKER	1.04	94,922	101,332	112,993	125,996	140,494	156,661	2.2%	2.2%
UNKNOWN	1.50	14,031	14,550	15,457	16,421	17,445	18,533	1.2%	1.2%
		1,108,977	1,180,985	1,321,451	1,493,376	1,705,270	1,968,045	2.5%	
Import Container Tons									
VesselGroup		2002	2005	2010	2015	2020	2025	CAGR02to25	
BULK	1.43	13,445	18,594	31,922	54,803	94,084	161,521	11.4%	11.4%
CARCARRIER	1.43	2,774	3,263	4,279	5,610	7,355	9,643	5.6%	5.6%
CONTAINER	1.43	3,072,246	3,659,094	4,896,694	6,552,881	8,769,233	11,735,212	6.0%	6.0%
GENERALCARGO	1.43	186,805	217,418	279,988	360,566	464,333	597,964	5.2%	5.2%
OTHER	1.43	1,141	1,367	1,846	2,492	3,366	4,546	6.2%	6.2%
RORO	1.43	30,888	35,825	45,871	58,732	75,200	96,286	5.1%	5.1%
UNKNOWN	1.43	3,694	4,315	5,591	7,245	9,387	12,163	5.3%	5.3%
		3,310,992	3,939,877	5,266,190	7,042,329	9,422,959	12,617,335	6.0%	
Import NonContainer Tons									
VesselGroup		2002	2005	2010	2015	2020	2025	CAGR02to25	
BULK	1.15	7,647,380	8,852,799	11,298,664	14,420,276	18,404,333	23,489,111	5.0%	5.0%
CARCARRIER	1.07	276,347	302,313	351,124	407,815	473,660	550,135	3.0%	3.0%
CONTAINER	1.07	77,044	85,675	102,263	122,062	145,695	173,903	3.6%	3.6%
GENERALCARGO	1.03	1,245,013	1,355,940	1,563,212	1,802,169	2,077,653	2,395,248	2.9%	2.9%
OTHER	1.03	4,604	4,870	5,347	5,870	6,445	7,077	1.9%	1.9%
PRODUCT	1.01	193,024	214,318	255,155	303,775	361,658	430,571	3.5%	3.5%
RORO	1.03	66,843	75,243	91,651	111,639	135,985	165,640	4.0%	4.0%
TANKER	1.01	641,180	718,522	868,709	1,050,287	1,269,820	1,535,239	3.9%	3.9%
UNKNOWN	1.03	9,751	10,322	11,347	12,475	13,714	15,077	1.9%	1.9%
		10,161,187	11,620,001	14,547,472	18,236,368	22,888,962	28,762,001	4.6%	
		2002	2005	2010	2015	2020	2025	CAGR02to25	
Total Container		5,036,001	5,995,383	8,019,455	10,730,730	14,364,781	19,239,394	6.0%	
Total NonContainer		11,270,164	12,800,986	15,868,923	19,729,744	24,594,232	30,730,046	4.5%	
Total		16,306,165	18,796,369	23,888,378	30,460,474	38,959,013	49,969,440	5.0%	

*The adjusted rate factor increases the projected growth rate for trades other than bulk imports and container.
Note: The containership growth rate is set to the level required to project total container tons at 6%

Table 3-25
Adjusted Base Forecast by Vessel Type - Optimistic

	BaseAdj.								Adjusted CAGR	Adj Rate Factor*
Export Container Tons										
VesselGroup		2002	2005	2010	2015	2020	2025	CAGR02to25	1.25	
BULK	1.85	2,161	2,627	3,640	5,042	6,985	9,676	6.7%	6.7%	
CARCARRIER	1.85	501	591	778	1,025	1,349	1,777	5.7%	5.7%	
CONTAINER	1.85	1,558,037	2,028,830	3,150,350	4,891,837	7,596,004	11,795,011	9.2%	9.2%	
GENERALCARGO	1.85	143,460	169,890	225,197	298,508	395,685	524,497	5.8%	5.8%	
OTHER	1.85	165	198	270	366	498	677	6.3%	6.3%	
RORO	1.85	20,020	23,763	31,622	42,079	55,994	74,510	5.9%	5.9%	
UNKNOWN	1.85	666	779	1,011	1,313	1,706	2,215	5.4%	5.4%	
		1,725,009	2,226,679	3,412,867	5,240,170	8,058,221	12,408,365	9.0%		
Export NonContainer Tons										
VesselGroup		2002	2005	2010	2015	2020	2025	CAGR01to25		
BULK	1.33	110,165	113,364	118,902	124,711	130,804	137,194	1.0%	1.0%	
CARCARRIER	1.33	287,973	340,814	451,293	597,586	791,302	1,047,813	5.8%	5.8%	
CONTAINER	1.33	8,743	9,817	11,907	14,441	17,516	21,245	3.9%	3.9%	
GENERALCARGO	1.50	577,518	590,895	613,883	637,765	662,576	688,353	0.8%	0.8%	
OTHER	1.50	4,635	5,211	6,336	7,703	9,365	11,386	4.0%	4.0%	
PRODUCT	1.04	1,173	1,180	1,191	1,202	1,213	1,224	0.2%	0.2%	
RORO	1.50	9,817	11,380	14,557	18,622	23,821	30,473	5.0%	5.0%	
TANKER	1.04	94,922	102,062	115,176	129,974	146,674	165,520	2.4%	2.4%	
UNKNOWN	1.50	14,031	14,608	15,623	16,708	17,869	19,111	1.4%	1.4%	
		1,108,977	1,189,330	1,348,867	1,548,712	1,801,140	2,122,317	2.9%		
Import Container Tons										
VesselGroup		2002	2005	2010	2015	2020	2025	CAGR02to25		
BULK	1.43	13,445	19,236	34,948	63,490	115,346	209,553	12.7%	12.7%	
CARCARRIER	1.43	2,774	3,321	4,483	6,052	8,170	11,030	6.2%	6.2%	
CONTAINER	1.43	3,072,246	4,000,589	6,212,081	9,646,068	14,978,334	23,258,232	9.2%	9.2%	
GENERALCARGO	1.43	186,805	221,012	292,503	387,119	512,340	678,066	5.8%	5.8%	
OTHER	1.43	1,141	1,393	1,944	2,711	3,781	5,274	6.9%	6.9%	
RORO	1.43	30,888	36,404	47,874	62,958	82,795	108,881	5.6%	5.6%	
UNKNOWN	1.43	3,694	4,388	5,847	7,791	10,382	13,834	5.9%	5.9%	
		3,310,992	4,286,345	6,599,680	10,176,190	15,711,148	24,284,870	9.0%		
Import NonContainer Tons										
VesselGroup		2002	2005	2010	2015	2020	2025	CAGR02to25		
BULK	1.15	7,647,380	9,500,317	13,638,933	19,580,453	28,110,272	40,355,931	7.5%	7.5%	
CARCARRIER	1.07	276,347	305,295	360,435	425,533	502,389	593,127	3.4%	3.4%	
CONTAINER	1.07	77,044	86,672	105,467	128,338	156,169	190,034	4.0%	4.0%	
GENERALCARGO	1.03	1,245,013	1,368,657	1,602,614	1,876,564	2,197,343	2,572,956	3.2%	3.2%	
OTHER	1.03	4,604	4,900	5,435	6,029	6,688	7,419	2.1%	2.1%	
PRODUCT	1.01	193,024	216,776	263,035	319,165	387,273	469,915	3.9%	3.9%	
RORO	1.03	66,843	76,217	94,851	118,040	146,900	182,814	4.5%	4.5%	
TANKER	1.01	641,180	727,481	897,893	1,108,224	1,367,826	1,688,239	4.3%	4.3%	
UNKNOWN	1.03	9,751	10,386	11,538	12,817	14,238	15,817	2.1%	2.1%	
		10,161,187	12,296,701	16,980,202	23,575,165	32,889,099	46,076,253	6.8%		
		2002	2005	2010	2015	2020	2025	CAGR02to25		
Total Container		5,036,001	6,513,023	10,012,547	15,416,360	23,769,368	36,693,235	9.0%		
Total NonContainer		11,270,164	13,486,031	18,329,069	25,123,878	34,690,239	48,198,570	6.5%		
Total		16,306,165	19,999,054	28,341,616	40,540,238	58,459,607	84,891,805	7.4%		

*The adjusted rate factor increases the projected growth rate for trades other than bulk imports and container.
Note: The containership growth rate is set to the level required to project total container tons at 9%

3.3.2 Vessel Size By Route

Table 3-26 shows the vessel size distribution by vessel type and route for major vessel types. The data are for the base years of 2002 for imports and 2001 for exports. In general the table highlights the use of medium size vessels in the Port of Veracruz trades. The following table shows the tons and share of tons by vessel size group. Each vessel size group represents a 10,000 deadweight ton range. For example, DWT Group 2 would include vessels with deadweight between 10,000 and 19,999 deadweight tons. The following section includes an analysis of the vessel calls by vessel type and size. Table 3-27 in that section includes average deadweight tons and average TEUs for each vessel size group.

The size distribution by vessel type and route in the following table shows the following:

The largest container trade is imports from Europe. As shown in the table, the largest tonnage is shown under DWT Group 5 (56.5%) which has an average deadweight of 41,669 tons and an average TEU level of 3,150. Only 12.4% of the trade is in Group 6 which has an average TEU of 4,016 and 8.6% of the trade is in Group 7 which has an average TEU level of 4,340.

The second largest trade is South America (East Coast) for which the dominant vessel size is Group 4 which has an average TEU level of 2,265.

The third most significant container trade is North America exports for which 74.1% of the tons are carried in vessels in Groups 2 and 1, the smallest containerships. This trade appears to be a regional container trade. As noted, most of the trade is destined for the way port local region and is not transshipped at a hub.

Bulk imports represent the largest trade. The largest vessel sizes are Groups 3,4 and 5 with average deadweights of 27,254 tons, 36,064 tons and 44,178 tons, respectively. The grain shipments in the largest vessels utilize the full capacity of the vessels. With larger vessels, larger shipment sizes are projected.

The dominant vessel in the largest tanker trade is under 20,000 tons and the dominant car carrier group is also under 20,000 tons.

In the following section, adjustment are included for the vessel sizes utilized in the import bulk grain trades for the probable and optimistic forecasts.

Table 3-26
Distribution by Vessel Type and Size by Route
2002 Imports and 2001 Exports

Imports Region	Vessel Type	DWT GRP	MTONS	Percent
1-North America	CONTAINER	1	9,181	7.7%
1-North America	CONTAINER	2	31,936	26.6%
1-North America	CONTAINER	3	27,307	22.8%
1-North America	CONTAINER	4	8,057	6.7%
1-North America	CONTAINER	5	16,176	13.5%
1-North America	CONTAINER	6	15,835	13.2%
1-North America	CONTAINER	7	11,505	9.6%
			120,000	100.0%
2-South America	CONTAINER	1	5,503	1.4%
2-South America	CONTAINER	2	54,499	14.3%
2-South America	CONTAINER	3	84,297	22.1%
2-South America	CONTAINER	4	184,187	48.3%
2-South America	CONTAINER	5	20,635	5.4%
2-South America	CONTAINER	6	20,949	5.5%
2-South America	CONTAINER	7	11,539	3.0%
			381,610	100.0%
3-Europe	CONTAINER	1	14,292	0.9%
3-Europe	CONTAINER	2	124,712	8.0%
3-Europe	CONTAINER	3	14,452	0.9%
3-Europe	CONTAINER	4	198,159	12.6%
3-Europe	CONTAINER	5	886,629	56.5%
3-Europe	CONTAINER	6	194,499	12.4%
3-Europe	CONTAINER	7	135,598	8.6%
			1,568,338	100.0%
1-North America	BULK	1	2,201	0.0%
1-North America	BULK	2	91,898	1.7%
1-North America	BULK	3	1,528,962	27.6%
1-North America	BULK	4	2,185,319	39.5%
1-North America	BULK	5	1,401,672	25.3%
1-North America	BULK	6	307,997	5.6%
1-North America	BULK	7	15,607	0.3%
			5,533,656	100.0%
1-North America	GENERALCARGO	1	227,204	38.3%
1-North America	GENERALCARGO	2	66,457	11.2%
1-North America	GENERALCARGO	3	107,847	18.2%
1-North America	GENERALCARGO	4	161,715	27.3%
1-North America	GENERALCARGO	5	29,831	5.0%
			593,054	100.0%
1-North America	TANKER	1	94,586	19.6%
1-North America	TANKER	2	368,106	76.1%
1-North America	TANKER	3	20,997	4.3%
			483,688	100.0%
2-South America	CARCARRIER	1	2,344	1.8%
2-South America	CARCARRIER	2	126,588	94.7%
2-South America	CARCARRIER	3	4,687	3.5%
			133,619	100.0%
2-South America	GENERALCARGO	1	28,808	7.8%
2-South America	GENERALCARGO	2	183,004	49.3%
2-South America	GENERALCARGO	3	98,078	26.4%
2-South America	GENERALCARGO	4	56,482	15.2%
2-South America	GENERALCARGO	5	2	0.0%
2-South America	GENERALCARGO	6	5,035	1.4%
			371,410	100.0%
3-Europe	BULK	1	20,031	2.5%
3-Europe	BULK	2	32,401	4.1%
3-Europe	BULK	3	429,041	53.8%
3-Europe	BULK	4	168,346	21.1%
3-Europe	BULK	5	84,448	10.6%
3-Europe	BULK	6	62,682	7.9%
			796,948	100.0%
3-Europe	CARCARRIER	1	2,091	1.9%
3-Europe	CARCARRIER	2	99,943	89.0%
3-Europe	CARCARRIER	3	10,289	9.2%
			112,323	100.0%
3-Europe	GENERALCARGO	1	57,276	24.7%
3-Europe	GENERALCARGO	2	114,316	49.4%
3-Europe	GENERALCARGO	3	32,216	13.9%
3-Europe	GENERALCARGO	4	21,117	9.1%
3-Europe	GENERALCARGO	5	169	0.1%
3-Europe	GENERALCARGO	6	6,435	2.8%
			231,530	100.0%

Exports Region	Vessel Type	DWT GRP	MTONS	Percent
1-North America	CONTAINER	1	133,746	35.2%
1-North America	CONTAINER	2	147,828	38.9%
1-North America	CONTAINER	3	17,853	4.7%
1-North America	CONTAINER	4	23,013	6.1%
1-North America	CONTAINER	5	49,954	13.2%
1-North America	CONTAINER	6	7,236	1.9%
			379,631	100.0%
2-South America	CONTAINER	1	8,817	5.0%
2-South America	CONTAINER	2	66,131	37.7%
2-South America	CONTAINER	3	59,841	34.1%
2-South America	CONTAINER	4	25,290	14.4%
2-South America	CONTAINER	5	13,596	7.7%
2-South America	CONTAINER	6	1,944	1.1%
			175,618	100.0%
3-Europe	CONTAINER	1	853	0.3%
3-Europe	CONTAINER	2	6,963	2.7%
3-Europe	CONTAINER	3	1,763	0.7%
3-Europe	CONTAINER	4	76,864	29.8%
3-Europe	CONTAINER	5	163,460	63.3%
3-Europe	CONTAINER	6	8,203	3.2%
			258,105	100.0%
1-North America	CARCARRIER	2	79,393	80.3%
1-North America	CARCARRIER	3	19,502	19.7%
			98,894	100.0%
1-North America	GENERALCARGO	1	115,592	89.6%
1-North America	GENERALCARGO	2	13,351	10.3%
1-North America	GENERALCARGO	3	87	0.1%
1-North America	GENERALCARGO	5	9	0.0%
			129,039	100.0%
3-Europe	CARCARRIER	2	52,934	66.3%
3-Europe	CARCARRIER	3	26,920	33.7%
			79,854	100.0%

The deadweight groups in these tables are as follows:

Deadweight Groups:

1	1-9,999	Deadweight Tons
2	10,000-19,999	Deadweight Tons
3	20,000-29,999	Deadweight Tons
4	30,000-39,999	Deadweight Tons
5	40,000-49,999	Deadweight Tons
6	50,000-59,999	Deadweight Tons
7	60,000-69,999	Deadweight Tons
8	70,000-79,999	Deadweight Tons
9	80,000-89,999	Deadweight Tons

3.3.3 Import Export Call Balance

Table 3-27 shows the base import and export calls by vessel type and size. Also shown in the table are the average deadweight and the average TEUs by vessel type and size.

While imports are the dominant direction of trade, the table shows that export calls for the smallest two sizes of containerships and the smallest general cargo vessel exceed imports and indicate that ballast calls in the inbound direction occur in the regional trades in which these smaller vessels operate. The adjusted vessel call forecast tables include the ballast calls for all vessel types by direction.

An increase in vessel size for bulk vessels carrying import grain is also included for both the probable and the optimistic forecasts. Based on the shipper interviews and related analysis it is projected that with the ability to serve larger vessels the Port of Veracruz would be more competitive in the grain trades and capture a larger volume of grain. The increase in vessel size is therefore associated with the probable and optimistic forecasts for bulk cargo and similarly for container cargo. The increase in vessel size and cargo tons per call for the larger vessels results in fewer vessel calls than would have been observed with the same level of cargo and the smaller vessel size distribution.

Similarly, an increase in vessel size for container vessels is included for both the probable and optimistic forecasts. While not cited as a factor by shippers and consignees, the global trends in containership size result in larger containerships being deployed in many trades as vessels on each trade are displaced by larger vessels displaced from other trades.

Table 3-27
Import and Export Calls and Balance
2002 Imports and 2001 Exports

Import Calls						Export Calls							
VesselGroup	Expr1	Avg Of Dwt	Avg Of Total TEU	Metric Tons	Calls	VesselGroup	Expr1	Avg Of Dwt	Avg Of Total TEU	Metric Tons	Calls	Balance	Ballast
BULK	1	3,525		28,760	3	BULK	1	2,102		397	2	1	1
BULK	2	14,145	99	185,059	20	BULK	2	17,007	0	10,502	4	16	16
BULK	3	27,254	256	2,060,410	117	BULK	3	23,803	413	68,820	6	111	111
BULK	4	36,064	260	2,477,877	105	BULK	4	35,063		482	1	104	104
BULK	5	44,178	776	1,546,941	52	BULK	5	45,919		679	1	51	51
BULK	6	50,805		370,680	9							9	9
BULK	7	64,900		18,602	2							2	2
CARCARRIER	1	8,423	362	4,435	4	CARCARRIER	1	7,426		2,541	3	1	1
CARCARRIER	2	14,586	1,210	240,481	150	CARCARRIER	2	14,277	210	162,256	119	31	31
CARCARRIER	3	27,346		16,503	31	CARCARRIER	3	27,639		48,083	30	1	1
CONTAINER	1	6,352	596	61,836	25	CONTAINER	1	7,180	600	144,288	90	-65	65
CONTAINER	2	14,271	1,045	265,501	98	CONTAINER	2	14,536	1,037	230,118	146	-48	48
CONTAINER	3	25,925	1,772	135,033	64	CONTAINER	3	25,634	1,682	79,676	69	-5	5
CONTAINER	4	33,659	2,265	418,055	84	CONTAINER	4	33,298	2,217	127,242	85	-1	1
CONTAINER	5	41,669	3,150	932,358	78	CONTAINER	5	42,462	2,985	243,712	87	-9	9
CONTAINER	6	56,585	4,016	239,537	19	CONTAINER	6	53,208	3,584	23,885	8	11	11
CONTAINER	7	61,644	4,340	166,567	13							13	13
GENERALCARGO	1	5,772	339	367,371	129	GENERALCARGO	1	4,600	383	262,366	188	-59	59
GENERALCARGO	2	15,786	583	400,818	90	GENERALCARGO	2	15,629	557	121,950	62	28	28
GENERALCARGO	3	23,520	617	279,849	42	GENERALCARGO	3	22,140	611	97,877	32	10	10
GENERALCARGO	4	38,163	1,202	239,314	12							12	12
GENERALCARGO	5	42,314	1,433	46,346	5	GENERALCARGO	5	44,088	1,695	7,408	3	2	2
GENERALCARGO	6	52,718	1,690	11,471	4							4	4
OTHER	1	1,384		5,290	4	OTHER	1	1,835		5,099	5	-1	1
PRODUCT	1	5,080		29,700	2							2	2
PRODUCT	2	17,485		103,924	10							10	10
PRODUCT	3	28,840		57,055	5							5	5
PRODUCT	4	32,101		7	1							1	1
						PRODUCT	5	45,274		1,192	1	-1	1
PRODUCT	7	60,774		427	1							1	1
RORO	1	8,192	424	22,427	13	RORO	1	4,340	415	2,793	2	11	11
RORO	2	16,531	1,246	44,869	22	RORO	2	11,960	686	4,794	6	16	16
RORO	4	33,648	2,233	19,498	12	RORO	4	33,648	2,233	10,871	11	1	1
TANKER	1	7,751		110,403	29	TANKER	1	7,829		21,890	4	25	25
TANKER	2	12,684		395,588	60	TANKER	2	12,104		34,556	4	56	56
TANKER	3	26,788		27,996	3	TANKER	3	23,900		16,028	2	1	1
TANKER	4	34,430		63,096	18							18	18
TANKER	5	48,309		9,000	1							1	1
						TANKER	6	54,661		3,232	1	-1	1
TANKER	10	94,001		28,747	3							3	3
UNKNOWN				12,095	7	UNKNOWN				10,394	6	1	1

3.3.4 Vessel Call Forecast

The following Table 3-28 projects the unadjusted base forecast of vessel calls by vessel type. The vessel calls are approximately equal to the import calls due to the dominance of the cargo movements in that direction. As a result most ballast calls are export ballast calls . However, as noted, some additional ballast vessel calls especially for inbound smaller containerships and small general cargo vessels are added to the next tables due to the larger cargo volumes exported in the regional trades.

For this analysis the ballast calls are, therefore, primarily export calls plus selected import ballasts, especially for the two smallest containership groups and the smallest general cargo vessel group. Total calls are the sum of import and export calls plus the ballast calls divided by two.

Shifts of cargo to larger vessels reduce the number of projected calls. However, the major trades in the Port of
Veracruz do not represent routes which will incorporate significant shifts by vessel size and type with the exception of bulk grain and container.

Key trades including regional container, auto carriers and even the line haul trades between Europe and East Coast South America and the Gulf of Mexico, seem to be well suited to moderate sized vessels. However, the shipper interviews and related analysis identified an increase in vessel size for bulk grain imports would increase the Port of Veracruz competitiveness and cargo handled in these trades. And despite the limited need for larger containerships cited in the interviews, the global trends towards larger containerships is expected to impact the services calling the Port of Veracruz. For the probable and optimistic forecasts, increases in the vessel sizes serving the import bulk grain trades are incorporated in conjunction with the projected increases in the bulk grain forecasts and increases in the vessel sizes in the container trades are also included for the probable and optimistic forecasts.

Table 3-28
Unadjusted Base Vessel Call Forecast by Vessel Type and Size without Ballast
2002 to 2025

Tonnage Forecast

Imports VesselGroup	Expr1	Avg Of Dwt	Avg Of Total TEU	2002	2005	2010	2015	2020	2025
BULK	1	3,925		28,760	29,697	32,490	35,141	37,671	40,807
BULK	2	14,145	99	185,058	204,930	244,957	284,454	323,196	370,173
BULK	3	27,254	256	2,060,410	2,231,411	2,558,612	2,886,210	3,190,128	3,545,936
BULK	4	36,064	260	2,477,877	2,697,695	3,126,857	3,567,745	3,988,721	4,491,432
BULK	5	44,178	776	1,546,941	1,662,095	1,856,096	2,035,828	2,187,681	2,354,855
BULK	6	50,805		370,680	407,280	490,153	580,494	670,834	779,636
BULK	7	64,900		18,602	20,491	23,429	26,400	29,322	32,771
CARCARRIER	1	8,423	362	4,435	4,589	5,105	5,734	6,332	6,994
CARCARRIER	2	14,586	1,210	240,481	246,664	286,950	336,084	386,334	445,701
CARCARRIER	3	27,346		16,503	17,049	20,081	23,758	27,577	32,189
CONTAINER	1	6,352	596	61,836	69,052	86,707	105,248	124,304	147,696
CONTAINER	2	14,271	1,045	265,501	291,713	372,875	455,158	555,003	686,598
CONTAINER	3	25,925	1,772	135,033	150,270	194,298	245,172	300,277	372,081
CONTAINER	4	33,659	2,265	418,055	466,920	607,846	771,092	948,850	1,179,932
CONTAINER	5	41,669	3,150	932,358	1,024,658	1,313,260	1,649,341	2,003,376	2,448,414
CONTAINER	6	56,585	4,016	239,537	264,013	338,439	421,322	507,683	615,417
CONTAINER	7	61,644	4,340	166,567	183,490	233,526	289,377	347,242	419,113
GENERALCARGO	1	5,772	339	367,371	392,827	457,975	529,774	603,004	693,826
GENERALCARGO	2	15,786	583	400,816	423,181	498,213	591,275	689,215	816,083
GENERALCARGO	3	23,620	617	279,849	303,935	368,420	438,231	514,029	607,166
GENERALCARGO	4	38,163	1,202	239,314	238,722	259,281	282,406	302,768	325,171
GENERALCARGO	5	42,314	1,433	46,346	49,505	56,718	64,307	71,656	80,883
GENERALCARGO	6	52,716	1,890	11,471	11,756	13,287	15,227	17,326	19,895
OTHER	1	1,384		5,290	5,223	5,801	6,822	7,935	9,320
PRODUCT	1	5,080		29,700	29,937	31,864	33,801	35,404	37,137
PRODUCT	2	17,485		103,924	117,234	144,282	171,766	198,509	229,766
PRODUCT	3	28,840		57,055	63,944	77,962	92,019	105,514	121,019
PRODUCT	4	32,101		7	6	12	16	21	28
PRODUCT	7	60,774		427	528	823	1,242	1,772	2,534
RORO	1	8,192	424	22,427	26,528	36,363	47,867	60,888	77,074
RORO	2	16,531	1,246	44,868	46,291	53,560	63,142	73,141	85,061
RORO	4	33,648	2,233	19,498	21,004	25,602	31,913	37,112	43,675
TANKER	1	7,751		110,403	123,973	153,524	184,343	214,319	249,729
TANKER	2	12,684		395,588	444,203	547,462	653,945	756,307	878,029
TANKER	3	26,788		27,996	30,073	34,408	38,680	42,619	47,050
TANKER	4	34,430		69,096	70,966	91,604	112,759	131,712	154,193
TANKER	5	48,309		9,000	10,017	12,052	14,176	16,172	18,449
TANKER	10	94,001		26,747	28,889	30,676	32,583	34,328	36,286
UNKNOWN				12,095	13,051	14,980	17,016	19,043	21,487

Exports VesselGroup	Expr1	Avg Of Dwt	Avg Of Total TEU	2002	2005	2010	2015	2020	2025
BULK	1	2,102		334	288	287	290	291	292
BULK	2	17,007	0	9,957	9,657	9,929	10,437	10,939	11,525
BULK	3	23,803	413	72,537	71,094	74,801	79,081	82,859	86,914
BULK	4	35,063		461	532	750	1,039	1,405	1,905
BULK	5	45,919		710	809	1,039	1,306	1,615	2,005
CARCARRIER	1	7,428		2,133	2,440	3,192	4,060	5,118	6,480
CARCARRIER	2	14,277	210	165,156	196,911	254,576	315,677	386,177	473,039
CARCARRIER	3	27,639		49,502	58,832	74,645	91,142	110,076	133,210
CONTAINER	1	7,180	600	148,498	163,349	198,912	243,059	294,304	359,374
CONTAINER	2	14,536	1,037	227,172	247,640	308,117	380,412	466,260	576,448
CONTAINER	3	25,634	1,682	73,177	77,574	99,460	125,732	157,816	199,484
CONTAINER	4	33,298	2,217	123,829	146,263	194,756	249,122	314,669	400,018
CONTAINER	5	42,462	2,985	250,815	292,733	370,431	454,753	564,046	679,236
CONTAINER	6	53,208	3,584	24,128	26,744	32,793	39,979	48,688	59,579
GENERALCARGO	1	4,600	383	253,307	256,336	278,153	302,979	328,980	361,520
GENERALCARGO	2	15,629	557	108,971	105,109	113,168	122,958	133,309	145,964
GENERALCARGO	3	22,140	611	93,054	92,890	103,315	115,325	128,440	145,112
GENERALCARGO	5	44,088	1,695	7,122	7,365	8,083	8,796	9,468	10,251
OTHER	1	1,835		3,179	3,265	3,953	4,700	5,554	6,637
PRODUCT	5	45,274		1,128	1,070	1,106	1,136	1,151	1,167
RORO	1	4,340	415	2,753	2,658	2,714	2,833	2,856	3,085
RORO	2	11,960	686	4,911	6,072	8,262	10,789	13,891	18,007
RORO	4	33,648	2,233	9,687	10,114	12,941	16,434	20,714	26,265
TANKER	1	7,829		25,304	26,229	28,930	32,276	35,692	39,509
TANKER	2	12,104		44,910	47,423	53,201	59,725	66,474	74,374
TANKER	3	23,900		17,825	19,200	20,943	22,473	23,908	25,441
TANKER	6	54,661		3,232	3,232	3,232	3,232	3,232	3,232
UNKNOWN				9,713	9,443	10,203	11,079	11,939	12,926

Vessel Call Forecast

2002 Base Calls	Import Vessel Type	Dwt Grp	Tons/Call	2002	2005	2010	2015	2020	2025	Expr2
3	BULK	1	9,587	3	3	3	4	4	4	35,414
20	BULK	2	9,253	20	22	26	31	35	40	310,905
117	BULK	3	17,610	117	127	145	164	181	201	3,096,359
105	BULK	4	23,599	105	114	133	151	169	190	3,866,328
52	BULK	5	29,749	52	56	62	68	74	79	2,127,862
9	BULK	6	41,187	9	10	12	14	16	19	824,742
2	BULK	7	9,301	2	2	3	3	3	4	18,049
4	CARCARRIER	1	1,109	4	4	5	5	6	6	5,007
150	CARCARRIER	2	1,803	150	154	179	210	241	278	371,545
31	CARCARRIER	3	532	31	32	38	45	52	60	21,925
25	CONTAINER	1	2,473	25	28	35	43	50	60	118,717
98	CONTAINER	2	2,709	98	108	138	168	205	253	535,129
64	CONTAINER	3	2,110	64	71	92	116	142	176	285,510
84	CONTAINER	4	4,977	84	94	122	155	191	237	908,124
78	CONTAINER	5	11,953	78	86	110	138	168	205	1,917,916
19	CONTAINER	6	12,607	19	21	27	33	40	49	478,708
13	CONTAINER	7	12,813	13	14	18	23	27	33	325,042
129	GENERALCARGO	1	2,848	129	138	161	186	212	244	584,549
90	GENERALCARGO	2	4,454	90	95	112	133	155	183	666,606
42	GENERALCARGO	3	8,863	42	46	55	66	77	91	493,533
12	GENERALCARGO	4	19,943	12	12	13	14	15	16	290,931
5	GENERALCARGO	5	9,269	5	5	6	7	8	9	64,143
4	GENERALCARGO	6	2,868	4	4	5	5	6	7	9,713
4	OTHER	1	1,322	4	4	4	5	6	7	7,311
2	PRODUCT	1	14,850	2	2	2	2	2	3	33,016
10	PRODUCT	2	10,392	10	11	14	17	19	22	183,974
5	PRODUCT	3	11,411	5	6	7	8	9	11	94,859
1	PRODUCT	4	7	1	1	2	2	3	4	-4,796
1	PRODUCT	7	427	1	1	2	3	4	6	-7,430
13	RORO	1	1,725	13	15	21	28	35	45	56,948
22	RORO	2	2,039	22	23	26	31	36	42	68,439
12	RORO	4	1,625	12	13	16	20	23	27	31,020
29	TANKER	1	3,807	29	33	40	48	56	66	200,229
60	TANKER	2	6,593	60	67	83	99	115	133	708,724
3	TANKER	3	9,332	3	3	4	4	5	5	36,263
18	TANKER	4	3,505	18	20	26	32	38	44	118,148
1	TANKER	5	9,000	1	1	1	2	2	2	7,958
3	TANKER	10	9,582	3	3	3	3	4	4	18,670
7	UNKNOWN	0	1,728	7	8	9	10	11	12	
1,347				1,347	1,457	1,760	2,096	2,444	2,877	

2002 Calls	Export Vessel Type	Grp	Tons/Call	2002	2005	2010	2015	2020	2025	Expr2
2	BULK	1	167	2	2	2	2	2	2	-35
4	BULK	2	2,489	4	4	4	4	4	5	8,548
6	BULK	3	12,089	6	6	6	7	7	7	79,397
1	BULK	4	461	1	1	2	2	3	4	-3,929
1	BULK	5	710	1	1	1	2	2	3	-5,367
3	CARCARRIER	1	711	3	3	4	6	7	9	3,718
119	CARCARRIER	2	1,388	119	142	183	227	278	341	368,978
30	CARCARRIER	3	1,650	30	36	45	55	67	81	99,531
90	CONTAINER	1	1,650	90	99	121	147	178	218	283,334
146	CONTAINER	2	1,556	146	159	198	244	300	370	448,210
69	CONTAINER	3	1,061	69	73	94	119	149	188	148,655
85	CONTAINER	4	1,457	85	100	134	171	216	275	298,239
87	CONTAINER	5	2,883	87	102	128	158	192	236	528,187
8	CONTAINER	6	3,016	8	9	11	13	16	20	39,663
188	GENERALCARGO	1	1,347	188	190	206	225	244	268	322,443
62	GENERALCARGO	2	1,758	62	60	64	70	76	83	128,796
32	GENERALCARGO	3	2,908	32	32	36	40	44	50	122,674
3	GENERALCARGO	5	2,374	3	3	3	4	4	4	3,278
5	OTHER	7	836	5	5	6	7	8	10	4,981
1	PRODUCT	5	1,128	1	1	1	1	1	1	-5,688
2	RORO	1	1,377	2	2	2	2	2	2	2,317
6	RORO	2	818	6	7	10	13	17	22	11,728
11	RORO	4	881	11	11	15	19	24	30	15,340
4	TANKER	1	6,326	4	4	5	5	6	6	32,629
4	TANKER	2	11,227	4	4	5	5	6	7	81,211
2	TANKER	3	8,913	2	2	2	3	3	3	19,172
1	TANKER	6	3,232	1	1	1	1	1	1	-5,078
6	UNKNOWN	0	1,619	6	6	6	7	7	8	
978				978	1,066	1,296	1,558	1,865	2,253	

3.3.5 Adjusted Call Forecast

Tables 3-29 to 3-33 show the adjusted vessel call forecasts by vessel type and size. Tables 3-29 to 3-33 include the projected vessel calls by vessel type and size for the base forecast, the probable forecast, the probable forecast including a shift to larger bulk and container vessels, the optimistic forecast and the optimistic forecast including a shift to larger bulk and container vessels, respectively. All of the tables include ballast vessel calls for both the export and import directions.

The vessel call forecasts also include an adjustment of 0.75% per year for the tons per call for export containerships. Due to the larger growth rate for exports in the regional trades combined with the relatively low tons per export call, the number of export calls and ballast import calls would have grown inappropriately without the adjustment. With strong growth in these trades, it has been assumed that the tons per call would increase and reduce the number of potential export calls and thereby reduce the number of import ballast calls. Given the nature of the regional trades, the tons per call has been increased in addition to the shifts to larger container vessel sizes for the probable and optimistic forecasts.

For the grain trades, an increase in vessel size is projected for the probable and optimistic forecasts. With an increase in the vessel sizes that can be handled in the Port of Veracruz, the increases in grain carriage associated with the probable and optimistic forecasts are projected. The vessel calls which are required to carry that higher level of forecast cargo volume are reduced due to the associated increase in tons per call for the larger vessels.

Table 3-29
Adjusted Call Forecast (Base)

Import Vessel Type	Grp	Tons/Call	Adjustment Factor	2002	2005	2010	2015	2020	2025
BULK	1	9,587	1.00	3	3	3	4	4	4
BULK	2	9,253	1.00	20	22	26	31	35	40
BULK	3	17,610	1.00	116	126	145	163	180	200
BULK	4	23,599	1.00	104	114	132	150	168	189
BULK	5	29,749	1.00	52	56	62	68	73	79
BULK	6	41,187	1.00	9	10	12	14	16	19
BULK	7	9,301	1.00	2	2	3	3	3	4
CARCARRIER	1	1,109	1.00	4	4	5	5	6	6
CARCARRIER	2	1,603	1.00	149	153	178	209	240	277
CARCARRIER	3	532	1.00	31	32	38	44	52	60
CONTAINER	1	2,473	1.00	25	28	35	42	50	59
CONTAINER	2	2,709	1.00	98	107	137	167	204	252
CONTAINER	3	2,110	1.00	64	71	92	116	142	175
CONTAINER	4	4,977	1.00	84	93	122	154	190	236
CONTAINER	5	11,953	1.00	78	85	109	137	167	204
CONTAINER	6	12,607	1.00	19	21	27	33	40	49
CONTAINER	7	12,813	1.00	13	14	18	22	27	33
GENERALCARGO	1	2,848	1.00	128	137	160	185	211	242
GENERALCARGO	2	4,454	1.00	90	95	111	132	154	182
GENERALCARGO	3	6,663	1.00	42	45	55	66	77	91
GENERALCARGO	4	19,943	1.00	12	12	13	14	15	16
GENERALCARGO	5	9,269	1.00	5	5	6	7	8	9
GENERALCARGO	6	2,868	1.00	4	4	5	5	6	7
OTHER	1	1,322	1.00	4	4	4	5	6	7
PRODUCT	1	14,850	1.00	2	2	2	2	2	2
PRODUCT	2	10,392	1.00	10	11	14	16	19	22
PRODUCT	3	11,411	1.00	5	6	7	8	9	11
PRODUCT	4	7	1.00	1	1	2	2	3	4
PRODUCT	7	427	1.00	1	1	2	3	4	6
RORO	1	1,725	1.00	13	15	21	28	35	44
RORO	2	2,039	1.00	22	23	26	31	36	41
RORO	4	1,625	1.00	12	13	16	20	23	27
TANKER	1	3,807	1.00	29	32	40	48	56	65
TANKER	2	6,593	1.00	60	67	83	99	114	132
TANKER	3	9,332	1.00	3	3	4	4	5	5
TANKER	4	3,505	1.00	18	20	26	32	37	44
TANKER	5	9,000	1.00	1	1	1	2	2	2
TANKER	10	9,582	1.00	3	3	3	3	4	4
UNKNOWN	0	1,728	1.00	7	8	9	10	11	12
				1,340	1,450	1,751	2,085	2,432	2,862
Export Vessel Type	**Grp**	**Tons/Call**		**2002**	**2005**	**2010**	**2015**	**2020**	**2025**
BULK	1	167	1.13	2	2	2	2	2	2
BULK	2	2,489	1.13	5	4	4	5	5	5
BULK	3	12,089	1.13	7	7	7	7	8	8
BULK	4	461	1.13	1	1	2	3	3	5
BULK	5	710	1.13	1	1	2	2	3	3
CARCARRIER	1	711	1.13	3	4	5	6	8	10
CARCARRIER	2	1,388	1.13	134	160	206	256	313	384
CARCARRIER	3	1,650	1.13	34	40	51	62	75	91
CONTAINER	1	1,650	1.13	101	109	128	150	176	206
CONTAINER	2	1,556	1.13	164	175	210	250	295	351
CONTAINER	3	1,061	1.13	78	81	99	121	146	178
CONTAINER	4	1,457	1.13	96	111	142	175	213	260
CONTAINER	5	2,883	1.13	98	112	136	161	189	223
CONTAINER	6	3,016	1.13	9	10	12	15	18	22
GENERALCARGO	1	1,347	1.13	212	214	232	253	275	302
GENERALCARGO	2	1,758	1.13	70	67	72	79	85	93
GENERALCARGO	3	2,908	1.13	36	36	40	45	50	56
GENERALCARGO	5	2,374	1.13	3	3	4	4	4	5
OTHER	1	636	1.13	6	6	7	8	10	12
PRODUCT	5	1,128	1.13	1	1	1	1	1	1
RORO	1	1,377	1.13	2	2	2	2	2	3
RORO	2	818	1.13	7	8	11	15	19	25
RORO	4	881	1.13	12	13	17	21	26	34
TANKER	1	6,326	1.13	5	5	5	6	6	7
TANKER	2	11,227	1.13	5	5	5	6	7	7
TANKER	3	8,913	1.13	2	2	3	3	3	3
TANKER	6	3,232	1.13	1	1	1	1	1	1
UNKNOWN	0	1,619	1.13	7	7	7	8	8	9
				1,101	1,187	1,415	1,667	1,952	2,308
Ballast				804	885	1,065	1,242	1,434	1,662
Total One Way Calls				3,245	3,522	4,231	4,994	5,818	6,832
Total Two Way Calls				1,623	1,761	2,115	2,497	2,909	3,416
TonPerCall Growth Adjustment Factor		0.75%		1.00	1.02	1.06	1.10	1.14	1.19

Note: Total Calls are Imports Plus Import Ballast Calls

Table 3-30
Adjusted Call Forecast Probable

Import Vessel Type	Grp	Tons/Call	Factor	2002	2005	2010	2015	2020	2025	Adjusted CAGR
BULK	1	9,587	1.00	3	3	4	6	7	9	5.0%
BULK	2	9,253	1.00	20	23	29	38	48	61	5.0%
BULK	3	17,610	1.00	116	135	172	220	280	358	5.0%
BULK	4	23,599	1.00	104	121	154	197	251	321	5.0%
BULK	5	29,749	1.00	52	60	76	98	125	159	5.0%
BULK	6	41,187	1.00	9	10	13	17	22	28	5.0%
BULK	7	9,301	1.00	2	2	3	4	5	6	5.0%
CARCARRIER	1	1,109	1.00	4	4	5	5	6	6	
CARCARRIER	2	1,603	1.00	149	153	178	209	240	277	
CARCARRIER	3	532	1.00	31	32	38	44	52	60	
CONTAINER	1	2,473	1.00	25	30	40	53	71	95	6.0%
CONTAINER	2	2,709	1.00	98	116	155	208	278	372	6.0%
CONTAINER	3	2,110	1.00	64	76	101	136	182	243	6.0%
CONTAINER	4	4,977	1.00	84	100	133	178	239	319	6.0%
CONTAINER	5	11,953	1.00	78	92	124	166	222	296	6.0%
CONTAINER	6	12,607	1.00	19	23	30	40	54	72	6.0%
CONTAINER	7	12,813	1.00	13	15	21	28	37	49	6.0%
GENERALCARGO	1	2,848	1.00	128	137	160	185	211	242	
GENERALCARGO	2	4,454	1.00	90	95	111	132	154	182	
GENERALCARGO	3	6,663	1.00	42	45	55	66	77	91	
GENERALCARGO	4	19,943	1.00	12	12	13	14	15	16	
GENERALCARGO	5	9,269	1.00	5	5	6	7	8	9	
GENERALCARGO	6	2,868	1.00	4	4	5	5	6	7	
OTHER	1	1,322	1.00	4	4	4	5	6	7	
PRODUCT	1	14,850	1.00	2	2	2	2	2	2	
PRODUCT	2	10,392	1.00	10	11	14	16	19	22	
PRODUCT	3	11,411	1.00	5	6	7	8	9	11	
PRODUCT	4	7	1.00	1	1	2	2	3	4	
PRODUCT	7	427	1.00	1	1	2	3	4	6	
RORO	1	1,725	1.00	13	15	21	28	35	44	
RORO	2	2,039	1.00	22	23	26	31	36	41	
RORO	4	1,625	1.00	12	13	16	20	23	27	
TANKER	1	3,807	1.00	29	32	40	48	56	65	
TANKER	2	6,593	1.00	60	67	83	99	114	132	
TANKER	3	9,332	1.00	3	3	4	4	5	5	
TANKER	4	3,505	1.00	18	20	26	32	37	44	
TANKER	5	9,000	1.00	1	1	1	2	2	2	
TANKER	10	9,582	1.00	3	3	3	3	4	4	
UNKNOWN	0	1,728	1.00	7	8	9	10	11	12	
				1,340	1,504	1,886	2,367	2,953	3,709	
Export Vessel Type	**Grp**	**Tons/Call**		**2002**	**2005**	**2010**	**2015**	**2020**	**2025**	
BULK	1	167	1.13	2	2	2	2	2	2	
BULK	2	2,489	1.13	5	4	4	5	5	5	
BULK	3	12,089	1.13	7	7	7	7	8	8	
BULK	4	461	1.13	1	1	2	3	3	5	
BULK	5	710	1.13	1	1	2	2	3	3	
CARCARRIER	1	711	1.13	3	4	5	6	8	10	
CARCARRIER	2	1,388	1.13	134	160	206	256	313	384	
CARCARRIER	3	1,650	1.13	34	40	51	62	75	91	
CONTAINER	1	1,650	1.13	101	118	150	183	215	243	6.1%
CONTAINER	2	1,556	1.13	164	192	243	297	349	395	6.1%
CONTAINER	3	1,061	1.13	78	91	115	140	165	187	6.1%
CONTAINER	4	1,457	1.13	96	112	142	173	203	230	6.1%
CONTAINER	5	2,883	1.13	98	114	145	177	208	235	6.1%
CONTAINER	6	3,016	1.13	9	11	14	19	26	35	6.1%
GENERALCARGO	1	1,347	1.13	212	214	232	253	275	302	
GENERALCARGO	2	1,758	1.13	70	67	72	79	85	93	
GENERALCARGO	3	2,908	1.13	36	36	40	45	50	56	
GENERALCARGO	5	2,374	1.13	3	3	4	4	4	5	
OTHER	1	636	1.13	6	6	7	8	10	12	
PRODUCT	5	1,128	1.13	1	1	1	1	1	1	
RORO	1	1,377	1.13	2	2	2	2	2	3	
RORO	2	818	1.13	7	8	11	15	19	25	
RORO	4	881	1.13	12	13	17	21	26	34	
TANKER	1	6,326	1.13	5	5	5	6	6	7	
TANKER	2	11,227	1.13	5	5	5	6	7	7	
TANKER	3	8,913	1.13	2	2	3	3	3	3	
TANKER	6	3,232	1.13	1	1	1	1	1	1	
UNKNOWN	0	1,619	1.13	7	7	7	8	8	9	
				1,101	1,228	1,496	1,783	2,081	2,391	
Ballast				904	914	1,151	1,388	1,713	2,155	
Total One Way Calls				3,245	3,646	4,534	5,538	6,746	8,254	
Total Two Way Calls				1,623	1,823	2,267	2,769	3,373	4,127	
TonPerCall Growth Adjustment Factor		0.75%		1.00	1.02	1.06	1.10	1.14	1.19	

Note: Total Calls are Imports Plus Import Ballast Calls

Table 3-31
Adjusted Call Forecast Probable with Bulk Vessel Size Shift

Import Vessel Type	Grp	Tons/Call	Factor	2002	2005	2010	2015	2020	2025	Adjusted CAGR	Shift % Per Period 2010to2025
BULK	1	9,587	1.00	3	3	4	6	7	9	5.0%	
BULK	2	9,253	1.00	20	23	26	30	34	37	5.0%	0.1 Decrease
BULK	3	17,610	1.00	116	135	146	154	154	143	5.0%	0.15 Decrease
BULK	4	23,599	1.00	104	121	139	158	176	193	5.0%	0.1 Decrease
BULK	5	29,749	1.00	52	60	77	100	129	167	5.0%	0.1 Increase
BULK	6	41,187	1.00	9	10	24	45	75	119	5.0%	0.15 Increase
BULK	7	9,301	1.00	2	2	42	104	196	332	5.0%	0.1 Increase
CARCARRIER	1	1,109	1.00	4	4	5	5	6	6	2.3%	
CARCARRIER	2	1,603	1.00	149	153	178	209	240	277	3.1%	
CARCARRIER	3	532	1.00	31	32	38	44	52	60	3.3%	
CONTAINER	1	2,473	1.00	25	30	38	48	60	76	6.0%	0.05 Decrease
CONTAINER	2	2,709	1.00	98	116	148	187	237	298	6.0%	0.05 Decrease
CONTAINER	3	2,110	1.00	64	76	96	122	155	195	6.0%	0.05 Decrease
CONTAINER	4	4,977	1.00	84	100	134	181	244	329	6.0%	0.05 Increase
CONTAINER	5	11,953	1.00	78	92	125	170	231	313	6.0%	0.05 Increase
CONTAINER	6	12,607	1.00	19	23	31	43	59	80	6.0%	0.05 Increase
CONTAINER	7	12,813	1.00	13	15	18	22	27	33	6.0%	
GENERALCARGO	1	2,848	1.00	128	137	160	185	211	242	3.2%	
GENERALCARGO	2	4,454	1.00	90	95	111	132	154	182	3.5%	
GENERALCARGO	3	6,663	1.00	42	45	55	66	77	91	3.9%	
GENERALCARGO	4	19,943	1.00	12	12	13	14	15	16	1.5%	
GENERALCARGO	5	9,269	1.00	5	5	6	7	8	9	2.8%	
GENERALCARGO	6	2,868	1.00	4	4	5	5	6	7	2.7%	
OTHER	1	1,322	1.00	4	4	4	5	6	7	2.8%	
PRODUCT	1	14,850	1.00	2	2	2	2	2	2	1.1%	
PRODUCT	2	10,392	1.00	10	11	14	16	19	22	3.9%	
PRODUCT	3	11,411	1.00	5	6	7	8	9	11	3.7%	
PRODUCT	4	7	1.00	1	1	2	2	3	4	7.4%	
PRODUCT	7	427	1.00	1	1	2	3	4	6	9.1%	
RORO	1	1,725	1.00	13	15	21	28	35	44	6.2%	
RORO	2	2,039	1.00	22	23	26	31	36	41	3.2%	
RORO	4	1,625	1.00	12	13	16	20	23	27	4.0%	
TANKER	1	3,807	1.00	29	32	40	48	56	65	4.1%	
TANKER	2	6,593	1.00	60	67	83	99	114	132	4.0%	
TANKER	3	9,332	1.00	3	3	4	4	5	5	2.6%	
TANKER	4	3,505	1.00	18	20	26	32	37	44	4.5%	
TANKER	5	9,000	1.00	1	1	1	2	2	2	3.6%	
TANKER	10	9,582	1.00	3	3	3	3	4	4	1.1%	
UNKNOWN	0	1,728	1.00	7	8	9	10	11	12	2.8%	
				1,340	1,504	1,880	2,349	2,916	3,642		
Export Vessel Type	**Grp**	**Tons/Call**		**2002**	**2005**	**2010**	**2015**	**2020**	**2025**		
BULK	1	167	1.13	2	2	2	2	2	2	-0.7%	
BULK	2	2,489	1.13	5	4	4	5	5	5	0.7%	
BULK	3	12,089	1.13	7	7	7	7	8	8	0.9%	
BULK	4	461	1.13	1	1	2	3	3	5	7.2%	
BULK	5	710	1.13	1	1	2	2	3	3	5.2%	
CARCARRIER	1	711	1.13	3	4	5	6	8	10	5.6%	
CARCARRIER	2	1,388	1.13	134	160	206	256	313	384	5.3%	
CARCARRIER	3	1,650	1.13	34	40	51	62	75	91	4.9%	
CONTAINER	1	1,650	1.13	101	118	142	165	183	195	6.0%	0.05 Decrease
CONTAINER	2	1,556	1.13	164	191	231	267	296	316	6.0%	0.05 Decrease
CONTAINER	3	1,061	1.13	78	90	109	126	140	149	6.0%	0.05 Decrease
CONTAINER	4	1,457	1.13	96	111	150	193	239	285	6.0%	0.05 Increase
CONTAINER	5	2,883	1.13	98	114	151	193	236	278	6.0%	0.05 Increase
CONTAINER	6	3,016	1.13	9	11	16	24	35	48	6.0%	0.05 Increase
GENERALCARGO	1	1,347	1.13	212	214	232	253	275	302	1.8%	
GENERALCARGO	2	1,758	1.13	70	67	72	79	85	93	1.4%	
GENERALCARGO	3	2,908	1.13	36	36	40	45	50	56	2.2%	
GENERALCARGO	5	2,374	1.13	3	3	4	4	4	5	1.8%	
OTHER	1	636	1.13	6	6	7	8	10	12	3.7%	
PRODUCT	5	1,128	1.13	1	1	1	1	1	1	0.2%	
RORO	1	1,377	1.13	2	2	2	2	2	3	0.6%	
RORO	2	818	1.13	7	8	11	15	19	25	6.5%	
RORO	4	881	1.13	12	13	17	21	26	34	5.0%	
TANKER	1	6,326	1.13	5	5	5	6	6	7	2.2%	
TANKER	2	11,227	1.13	5	5	5	6	7	7	2.5%	
TANKER	3	8,913	1.13	2	2	3	3	3	3	1.8%	
TANKER	6	3,232	1.13	1	1	1	1	1	1	0.0%	
UNKNOWN	0	1,619	1.13	7	7	7	8	8	9	1.4%	
				1,101	1,226	1,488	1,763	2,045	2,337		
Ballast				804	912	1,177	1,445	1,747	2,209		
Total One Way Calls				3,245	3,642	4,544	5,557	6,709	8,187		
Total Two Way Calls				1,623	1,821	2,272	2,778	3,354	4,094		
TonPerCall Growth		0.75%		1.00	1.02	1.06	1.10	1.14	1.19		
Adjustment Factor											

Note: Total Calls are Imports Plus Import Ballast Calls

Table 3-32
Adjusted Call Forecast Optimistic

Import Vessel Type	Grp	Tons/Call	Factor	2002	2005	2010	2015	2020	2025	Adjusted CAGR
BULK	1	9,587	1.00	3	4	5	8	11	16	7.5%
BULK	2	9,253	1.00	20	25	35	51	73	105	7.5%
BULK	3	17,610	1.00	116	145	208	298	428	614	7.5%
BULK	4	23,599	1.00	104	130	186	268	384	551	7.5%
BULK	5	29,749	1.00	52	64	92	132	190	273	7.5%
BULK	6	41,187	1.00	9	11	16	23	33	47	7.5%
BULK	7	9,301	1.00	2	2	4	5	7	11	7.5%
CARCARRIER	1	1,109	1.00	4	4	5	5	6	6	
CARCARRIER	2	1,603	1.00	149	153	178	209	240	277	
CARCARRIER	3	532	1.00	31	32	38	44	52	60	
CONTAINER	1	2,473	1.00	25	32	50	78	121	188	9.2%
CONTAINER	2	2,709	1.00	98	127	197	306	475	738	9.2%
CONTAINER	3	2,110	1.00	64	83	129	200	310	482	9.2%
CONTAINER	4	4,977	1.00	84	109	169	262	407	633	9.2%
CONTAINER	5	11,953	1.00	78	101	157	244	378	588	9.2%
CONTAINER	6	12,607	1.00	19	25	38	59	92	143	9.2%
CONTAINER	7	12,813	1.00	13	17	26	41	63	98	9.2%
GENERALCARGO	1	2,848	1.00	128	137	160	185	211	242	
GENERALCARGO	2	4,454	1.00	90	95	111	132	154	182	
GENERALCARGO	3	8,663	1.00	42	45	55	66	77	91	
GENERALCARGO	4	19,943	1.00	12	12	13	14	15	16	
GENERALCARGO	5	9,269	1.00	5	5	6	7	8	9	
GENERALCARGO	6	2,868	1.00	4	4	5	5	6	7	
OTHER	1	1,322	1.00	4	4	4	5	6	7	
PRODUCT	1	14,850	1.00	2	2	2	2	2	2	
PRODUCT	2	10,392	1.00	10	11	14	16	19	22	
PRODUCT	3	11,411	1.00	5	6	7	8	9	11	
PRODUCT	4	7	1.00	1	1	2	2	3	4	
PRODUCT	7	427	1.00	1	1	2	3	4	6	
RORO	1	1,725	1.00	13	15	21	28	35	44	
RORO	2	2,039	1.00	22	23	26	31	36	41	
RORO	4	1,625	1.00	12	13	16	20	23	27	
TANKER	1	3,807	1.00	29	32	40	48	56	65	
TANKER	2	6,593	1.00	60	67	83	99	114	132	
TANKER	3	9,332	1.00	3	3	4	4	5	5	
TANKER	4	3,505	1.00	18	20	26	32	37	44	
TANKER	5	9,000	1.00	1	1	1	2	2	2	
TANKER	10	9,582	1.00	3	3	3	3	4	4	
UNKNOWN	0	1,728	1.00	7	8	9	10	11	12	
				1,340	1,572	2,142	2,955	4,108	5,807	
Export Vessel Type	**Grp**	**Tons/Call**		**2002**	**2005**	**2010**	**2015**	**2020**	**2025**	
BULK	1	167	1.13	2	2	2	2	2	2	
BULK	2	2,489	1.13	5	4	4	5	5	5	
BULK	3	12,089	1.13	7	7	7	7	8	8	
BULK	4	461	1.13	1	1	2	3	3	5	
BULK	5	710	1.13	1	1	2	2	3	3	
CARCARRIER	1	711	1.13	3	4	5	6	8	10	
CARCARRIER	2	1,388	1.13	134	160	206	256	313	384	
CARCARRIER	3	1,650	1.13	34	40	51	62	75	91	
CONTAINER	1	1,650	1.13	101	129	189	266	361	472	9.2%
CONTAINER	2	1,556	1.13	164	209	306	431	585	765	9.2%
CONTAINER	3	1,061	1.13	78	99	145	204	277	362	9.2%
CONTAINER	4	1,457	1.13	96	122	178	251	341	446	9.2%
CONTAINER	5	2,883	1.13	98	125	182	257	349	456	9.2%
CONTAINER	6	3,016	1.13	9	12	18	28	44	68	9.2%
GENERALCARGO	1	1,347	1.13	212	214	232	253	275	302	
GENERALCARGO	2	1,758	1.13	70	67	72	79	85	93	
GENERALCARGO	3	2,908	1.13	36	36	40	45	50	56	
GENERALCARGO	5	2,374	1.13	3	3	4	4	4	5	
OTHER	1	636	1.13	6	6	7	8	10	12	
PRODUCT	5	1,128	1.13	1	1	1	1	1	1	
RORO	1	1,377	1.13	2	2	2	2	2	3	
RORO	2	818	1.13	7	8	11	15	19	25	
RORO	4	881	1.13	12	13	17	21	26	34	
TANKER	1	6,326	1.13	5	5	5	6	6	7	
TANKER	2	11,227	1.13	5	5	5	6	7	7	
TANKER	3	8,913	1.13	2	2	3	3	3	3	
TANKER	6	3,232	1.13	1	1	1	1	1	1	
UNKNOWN	0	1,619	1.13	7	7	7	8	8	9	
				1,101	1,285	1,706	2,232	2,872	3,635	
Ballast				804	973	1,356	1,852	2,646	3,789	
Total One Way Calls				3,245	3,831	5,204	7,040	9,626	13,231	
Total Two Way Calls				1,623	1,915	2,602	3,520	4,813	6,615	
TonPerCall Growth		0.75%		1.00	1.02	1.06	1.10	1.14	1.19	
Adjustment Factor										

Note: Total Calls are Imports Plus Import Ballast Calls

Table 3-33
Adjusted Call Forecast Optimistic With Bulk Vesel Size Shift

Import Vessel Type	Grp	Tons/Call	Factor	2002	2005	2010	2015	2020	2025	Adjusted CAGR	Shift % Per Period 2010to2025
BULK	1	9,587	1.00	3	4	5	8	11	16	7.5%	
BULK	2	9,253	1.00	20	25	32	41	51	63	7.5%	0.1 Decrease
BULK	3	17,610	1.00	116	145	176	209	235	246	7.5%	0.15 Decrease
BULK	4	23,599	1.00	104	130	168	214	269	331	7.5%	0.1 Decrease
BULK	5	29,749	1.00	52	64	93	136	197	286	7.5%	0.1 Increase
BULK	6	41,187	1.00	9	11	29	61	115	205	7.5%	0.15 Increase
BULK	7	50,000	1.00	2	2	12	30	62	115	7.5%	0.1 Increase
CARCARRIER	1	1,109	1.00	4	4	5	5	6	7	2.5%	
CARCARRIER	2	1,603	1.00	149	165	195	230	272	322	3.4%	
CARCARRIER	3	532	1.00	31	34	41	49	59	71	3.7%	
CONTAINER	1	2,473	1.00	25	32	48	70	103	151	9.2%	0.05 Decrease
CONTAINER	2	2,709	1.00	98	127	187	276	404	591	9.2%	0.05 Decrease
CONTAINER	3	2,110	1.00	64	83	122	180	264	386	9.2%	0.05 Decrease
CONTAINER	4	4,977	1.00	84	109	170	266	417	651	9.2%	0.05 Increase
CONTAINER	5	11,953	1.00	78	101	159	251	395	621	9.2%	0.05 Increase
CONTAINER	6	12,607	1.00	19	25	39	63	100	159	9.2%	0.05 Increase
CONTAINER	7	12,813	1.00	13	18	31	53	92	158	11.5%	
GENERALCARGO	1	2,848	1.00	128	142	169	201	239	283	3.5%	
GENERALCARGO	2	4,454	1.00	90	101	122	148	179	217	3.9%	
GENERALCARGO	3	6,663	1.00	42	47	58	72	89	110	4.3%	
GENERALCARGO	4	19,943	1.00	12	13	14	15	16	18	1.7%	
GENERALCARGO	5	9,269	1.00	5	5	6	7	9	10	3.1%	
GENERALCARGO	6	2,868	1.00	4	4	5	6	7	8	3.0%	
OTHER	1	1,322	1.00	4	4	5	6	7	8	3.1%	
PRODUCT	1	14,850	1.00	2	2	2	2	2	3	1.2%	
PRODUCT	2	10,392	1.00	10	11	14	17	22	27	4.4%	
PRODUCT	3	11,411	1.00	5	6	7	8	10	13	4.2%	
PRODUCT	4	7	1.00	1	1	2	3	4	6	8.2%	
PRODUCT	7	427	1.00	1	1	2	3	6	9	10.1%	
RORO	1	1,725	1.00	13	16	22	31	43	60	6.9%	
RORO	2	2,039	1.00	22	24	29	34	41	49	3.5%	
RORO	4	1,625	1.00	12	14	17	21	26	33	4.5%	
TANKER	1	3,807	1.00	29	33	41	51	64	80	4.5%	
TANKER	2	6,593	1.00	60	68	84	104	130	161	4.4%	
TANKER	3	9,332	1.00	3	3	4	4	5	6	2.9%	
TANKER	4	3,505	1.00	18	21	26	34	43	54	5.0%	
TANKER	5	9,000	1.00	1	1	1	2	2	2	4.0%	
TANKER	10	9,562	1.00	3	3	3	4	4	4	1.3%	
UNKNOWN	0	1,728	1.00	7	8	9	10	12	14	3.2%	
				1,340	1,608	2,158	2,927	4,010	5,550		
Export Vessel Type	**Grp**	**Tons/Call**		**2002**	**2005**	**2010**	**2015**	**2020**	**2025**		
BULK	1	167	1.13	2	2	2	2	2	2	-0.7%	
BULK	2	2,489	1.13	5	5	5	5	5	5	0.8%	
BULK	3	12,089	1.13	7	7	7	8	8	8	1.0%	
BULK	4	461	1.13	1	1	2	3	4	7	8.0%	
BULK	5	710	1.13	1	1	2	2	3	4	5.8%	
CARCARRIER	1	711	1.13	3	4	5	7	10	13	6.2%	
CARCARRIER	2	1,388	1.13	134	159	211	281	373	495	5.9%	
CARCARRIER	3	1,650	1.13	34	40	52	68	88	116	5.5%	
CONTAINER	1	1,650	1.13	101	129	179	239	307	377	9.2%	0.05 Decrease
CONTAINER	2	1,556	1.13	164	209	291	388	498	612	9.2%	0.05 Decrease
CONTAINER	3	1,061	1.13	78	99	137	183	235	289	9.2%	0.05 Decrease
CONTAINER	4	1,457	1.13	96	122	189	281	402	553	9.2%	0.05 Increase
CONTAINER	5	2,883	1.13	98	125	191	280	396	539	9.2%	0.05 Increase
CONTAINER	6	3,016	1.13	9	12	21	35	58	94	9.2%	0.05 Increase
GENERALCARGO	1	1,347	1.13	212	224	247	272	299	330	1.9%	
GENERALCARGO	2	1,758	1.13	70	73	79	86	93	101	1.6%	
GENERALCARGO	3	2,908	1.13	36	39	44	49	56	63	2.4%	
GENERALCARGO	5	2,374	1.13	3	4	4	4	5	5	2.0%	
OTHER	1	636	1.13	6	6	8	9	12	14	4.1%	
PRODUCT	5	1,128	1.13	1	1	1	1	1	1	0.2%	
RORO	1	1,377	1.13	2	2	2	2	3	3	0.6%	
RORO	2	818	1.13	7	8	12	17	24	34	7.3%	
RORO	4	881	1.13	12	15	19	25	33	43	5.5%	
TANKER	1	6,326	1.13	5	5	5	6	7	8	2.4%	
TANKER	2	11,227	1.13	5	5	6	6	7	8	2.8%	
TANKER	3	8,913	1.13	2	2	3	3	3	4	1.9%	
TANKER	6	3,232	1.13	1	1	1	1	1	1	0.0%	
UNKNOWN	0	1,619	1.13	7	7	8	8	9	10	1.6%	
				1,101	1,307	1,733	2,274	2,942	3,739		
Ballast				804	973	1,346	1,817	2,434	3,449		
Total One Way Calls				3,245	3,888	5,236	7,018	9,387	12,738		
Total Two Way Calls				1,623	1,944	2,618	3,509	4,693	6,369		
TonPerCall Growth		0.75%		1.00	1.02	1.06	1.10	1.14	1.19		
Adjustment Factor											

Note: Total Calls are Imports Plus Import Ballast Calls

Forecast Summary

The following Table 3-33 summarizes the projected tons and vessel calls for the base forecast, the probable forecast and the optimistic forecast. The probable and optimistic forecasts include projected shifts of container and grain cargo to larger vessel sizes.

The three forecasts project Port of Veracruz tons by 2025 of 33.5 million tons (base forecast), 49.1 million tons (probable forecast) and 83.4 million tons (optimistic forecast).

The vessel calls are projected to increase from 1,623 in 2002 to
3,416 calls (base forecast), 4,094 calls (probable forecast) and 6,369 calls (optimistic forecast with bulk shift) by 2025.

As shown in the Table 3-34 and detailed in Table 3-35, the current 2025 forecast is between 14.3 and 19.1% below the previous forecasts. The primary difference between the current forecasts and the previous forecasts is in the bulk grain trades. The slow down in recent years has led to a lower base and lower projected growth rate for the grain trade, which results in a variance from the previous forecast. It should be noted, however, that while the forecasts are somewhat below the previous forecast the results continue to demonstrate strong growth for the Port of Veracruz.

Table 3-35 shows the adjusted base forecast variance from the previous pessimistic forecast is more than made up by the grain (bulk vessel) forecast while the container forecast is higher. For the probable forecast the primary difference is the grain (bulk vessel) forecast (87.7% of the total difference) and for the optimistic forecast both the grain (bulk vessel) and container trades are both below the previous forecast.

Tables 3-36A and B provide additional detail on grain and non grain bulk vessel imports and also calculates the projected number of automobile units handled by direction, based on the projected car carrier tons and the most recent reported auto units per ton. Tables 3-37A and B provide detail on forecast TEUs and the tonnage forecasts for general cargo and fluids.

In conclusion, the Port of Veracruz continues to exhibit strong growth potential for the forecast period. The strong growth is consistently supported by economic analysis, trade studies and analysis and shipper/carrier interviews. Of particular note are the probable and optimistic forecasts which reflect significant growth in the grain trades with the ability to handle larger bulk vessels and significant increases in larger container vessel calls due to the growth of container trades served by the Port of Veracruz and the influence of global increases in containership sizes. The automobile trades also are projected to exhibit strong growth in both directions.

Table 3-34
Forecast Summary

Base	2002	2005	2010	2015	2020	2025		Previous Forecast	Percent Difference
Total Tons	16,306,165	17,736,283	21,165,659	24,886,115	28,740,682	33,498,674	3.2%	39,108	-14.3%
Total Calls	1,623	1,761	2,115	2,497	2,909	3,416	3.3%		
Probable (With Shift)	2002	2005	2010	2015	2020	2025			
Total Tons	16,306,165	18,796,369	23,888,378	30,460,474	38,959,013	49,969,440	5.0%	61,632	-18.9%
Total Calls	1,623	1,821	2,272	2,778	3,354	4,094	4.1%		
Optimistic (With Shift)	2002	2005	2010	2015	2020	2025			
Total Tons	16,306,165	19,999,054	28,341,616	40,540,238	58,459,607	84,891,805	7.4%	101,498	-16.4%
Total Calls	1,623	1,944	2,618	3,509	4,693	6,369	6.1%		

Table 3-35
Previous Forecast Comparison
(000s of Tons)

	2001/2002 Prev/Curr	2005	2010	2015	2020	2025
			Base			
Previous Forecast						
Bulk Grain+ Minerals	7,935	10,468	14,884	17,631	20,891	24,751
Container	5,176	5,754	6,568	7,781	9,220	10,924
Other	2,673	2,367	2,063	2,445	2,898	3,433
Total	15,784	18,589	23,515	27,857	33,009	39,108
Current Forecast						
Bulk Grain+ Minerals	7,758	8,400	9,632	10,863	12,004	13,332
Container	5,036	5,601	7,176	8,984	11,009	13,609
Other	3,513	3,736	4,358	5,039	5,727	6,557
Total	16,306	17,736	21,166	24,886	28,741	33,499
Difference						
Bulk Grain+ Minerals	-177	-2,068	-5,252	-6,768	-8,887	-11,419
Container	-140	-153	608	1,203	1,789	2,685
Other	840	1,369	2,295	2,594	2,829	3,124
Total	522	-853	-2,349	-2,971	-4,268	-5,609
Percent Difference						
Bulk Grain+ Minerals	-2.2%	-19.8%	-35.3%	-38.4%	-42.5%	-46.1%
Container	-2.7%	-2.7%	9.3%	15.5%	19.4%	24.6%
Other	31.4%	57.8%	111.2%	106.1%	97.6%	91.0%
Total	3.3%	-4.6%	-10.0%	-10.7%	-12.9%	-14.3%
			Probable			
Previous Forecast						
Bulk Grain+ Minerals	7,935	11,092	17,223	21,805	27,604	34,947
Container	5,176	6,959	10,075	12,755	16,147	20,442
Other	2,673	2,845	3,077	3,895	4,931	6,243
Total	15,784	20,896	30,375	38,455	48,682	61,632
Current Forecast						
Bulk Grain+ Minerals	7,758	8,966	11,417	14,543	18,533	23,623
Container	5,036	5,995	8,019	10,731	14,365	19,239
Other	3,513	3,835	4,452	5,186	6,061	7,107
Total	16,306	18,796	23,888	30,460	38,959	49,969
Difference						
Bulk Grain+ Minerals	-177	-2,126	-5,806	-7,262	-9,071	-11,324
Container	-140	-964	-2,056	-2,024	-1,782	-1,203
Other	840	990	1,375	1,291	1,130	864
Total	522	-2,100	-6,487	-7,995	-9,723	-11,663

Prev/Current	2001/2002	2005	2010	2015	2020	2025
Percent Difference						
Bulk Grain+ Minerals	-2.2%	-19.2%	-33.7%	-33.3%	-32.9%	-32.4%
Container	-2.7%	-13.8%	-20.4%	-15.9%	-11.0%	-5.9%
Other	31.4%	34.8%	44.7%	33.2%	22.9%	13.8%
Total	3.3%	-10.0%	-21.4%	-20.8%	-20.0%	-18.9%
			Optimistic			
Previous Forecast						
Bulk Grain+ Minerals	7,935	11,150	17,092	23,861	33,310	46,501
Container	5,176	8,679	16,557	23,114	32,267	45,045
Other	2,673	3,073	3,658	5,107	7,129	9,952
Total	15,784	22,902	37,307	52,082	72,706	101,498
Current Forecast						
Bulk Grain+ Minerals	7,758	9,614	13,758	19,705	28,241	40,493
Container	5,036	6,513	10,013	15,416	23,769	36,693
Other	3,513	3,872	4,571	5,419	6,449	7,705
Total	16,306	19,999	28,342	40,540	58,460	84,892
Difference						
Bulk Grain+ Minerals	-177	-1,536	-3,334	-4,156	-5,069	-6,008
Container	-140	-2,166	-6,544	-7,698	-8,498	-8,352
Other	840	799	913	312	-680	-2,247
Total	522	-2,903	-8,965	-11,542	-14,246	-16,606
Percent Difference						
Bulk Grain+ Minerals	-2.2%	-13.8%	-19.5%	-17.4%	-15.2%	-12.9%
Container	-2.7%	-25.0%	-39.5%	-33.3%	-26.3%	-18.5%
Other	31.4%	26.0%	25.0%	6.1%	-9.5%	-22.6%
Total	3.3%	-12.7%	-24.0%	-22.2%	-19.6%	-16.4%

Tables 3-36A and B provide supplemental detail to support planning projects utilizing these forecasts. Table 3-36A provides the calculation of automobile units. The figures are based on the forecast of automobile tons on car carriers converted to units based on the latest value of units per ton reported by the Port of Veracruz. Forecasts for the base, probable and optimistic forecasts are shown.

Table 3-36B shows the grain forecast based on applying the forecasts and forecast adjustments to the grain carried on bulk vessels import calls. The projected grain forecasts are compared with the forecasts of bulk vessel imports to show the projected levels of non grain bulk vessel imports. Forecasts for the base, probable and optimistic forecasts are shown.

Table 3-36A
Auto Unit Forecast 2002 to 2025

Historical Year	1998	1999	2000	2001	2002	2003
Export Auto Tons	160,816	200,357	210,877	242,686	282,593	353,339
Export Auto Units	132,637	162,851	168,167	188,363	191,133	233,676
Export Auto Units Per Ton	0.825	0.813	0.797	0.776	0.676	0.661
Import Auto Tons	59,008	116,374	152,644	200,094	272,866	304,288
Import Auto Units	47,360	84,822	133,793	165,956	226,401	254,688
Import Auto Units Per Ton	0.803	0.729	0.877	0.829	0.830	0.837
Source Port of Veracruz						
Automobile Unit Forecast						
Base Forecast	2002	2005	2010	2015	2020	2025
Export Car Carrier Tons	287,973	342,993	441,607	545,703	666,033	813,934
Export Car Carrier Units	190,447	226,834	292,051	360,893	440,472	538,284
Import Car Carrier Tons	276,347	283,395	329,328	385,326	442,553	510,134
Import Car Carrier Units	231,302	237,200	275,646	322,516	370,415	426,980
Total Car Carrier Tons	564,321	626,388	770,935	931,029	1,108,585	1,324,068
Total Car Carrier Units	421,749	464,034	567,697	683,410	810,887	965,265
Probable Forecast						
Export Car Carrier Tons	287,973	335,261	431,950	556,525	717,028	923,819
Export Car Carrier Units	190,447	221,720	285,665	368,051	474,197	610,956
Import Car Carrier Tons	276,347	302,313	351,124	407,815	473,660	550,135
Import Car Carrier Units	231,302	253,035	293,889	341,340	396,451	460,461
Total Car Carrier Tons	564,321	637,574	783,074	964,340	1,190,687	1,473,955
Total Car Carrier Units	421,749	474,755	579,554	709,390	870,648	1,071,417
Optimistic Forecast						
Export Car Carrier Tons	287,973	340,814	451,293	597,586	791,302	1,047,813
Export Car Carrier Units	190,447	225,393	298,457	395,206	523,317	692,957
Import Car Carrier Tons	276,347	305,295	360,435	425,533	502,389	593,127
Import Car Carrier Units	231,302	255,531	301,682	356,170	420,498	496,445
Total Car Carrier Tons	564,321	646,109	811,728	1,023,119	1,293,691	1,640,940
Total Car Carrier Units	421,749	480,923	600,139	751,375	943,815	1,189,402

Table 36B
Bulk Vessel Grain and Non Grain Forecast 2002 to 2025

Year	2002	2005	2010	2015	2020	2025
Import Bulk Vessel Forecast						
Base Bulk Vessel Forecast	7,647,380	8,291,823	9,519,207	10,743,812	11,878,646	13,200,570
Probable Bulk Vessel Forecast	7,647,380	8,852,799	11,298,664	14,420,276	18,404,333	23,489,111
Optimistic Bulk Vessel Forecast	7,647,380	9,500,317	13,638,933	19,580,453	28,110,272	40,355,931
Import Grain Forecasts						
Base Grain Forecast	5,903,641	6,503,121	7,505,444	8,483,357	9,373,791	10,397,705
Probable Grain Forecast	5,903,641	6,834,203	8,722,367	11,132,196	14,207,816	18,133,174
Optimisti Grain Forecast	5,903,641	7,334,075	10,529,013	15,115,760	21,700,628	31,154,058
Import Non Grain Bulk Forecast						
Base Import Non Grain Bulk Forecast	1,743,739	1,788,702	2,013,763	2,260,455	2,504,855	2,802,866
Probable Import Non Grain Bulk Forecast	1,743,739	2,018,596	2,576,297	3,288,080	4,196,517	5,355,937
Optimistic Import Non Grain Bulk Forecast	1,743,739	2,166,242	3,109,920	4,464,693	6,409,644	9,201,873
Export Bulk Base	110,165	107,787	113,080	119,453	125,149	131,326
Export Bulk Probable	110,165	113,041	118,002	123,181	128,586	134,229
Export Bulk Optimistic	110,165	113,364	118,902	124,711	130,804	137,194

Tables 3-37A and B provide detail on container TEUs and general cargo and fluid trades. Table 3-37A provides the calculation of projected container TEUs. The figures are based on the forecast of container tons converted to TEUs based on the 2002 container tons and TEUs reported by the Port of Veracruz. Total TEUs are forecast to increase between 2002 and 2025 from 548,324 TEUs to 1,481,932 TEUs (base forecast), to 2,076,668 TEUs (probable forecast) and to 3,983,510 TEUs (optimistic forecast) including empties.

Table 3-37B shows the general cargo and fluids forecasts. General cargo tons are projected to increase from 2,017,999 tons in 2002 to 3,293,961 tons (base), to 3,509,061 tons (probable) and to 3,739,607 tons (optimistic) in 2025. Fluid tons are projected to increase from 930,298 tons in 2002 to 1,939,415 tons (base), to 2,123,690 tons (probable) and to 2,324,698 tons (optimistic) in 2025.

Table 3-37A
Container TEU Forecast

Year	2002	2005	2010	2015	2020	2025
Container Imports Tons						
Base Container Forecast	3,310,992	3,660,412	4,722,353	5,935,698	7,253,276	8,945,774
Probable Container Forecast	3,310,992	3,939,877	5,266,190	7,042,329	9,422,959	12,617,335
Optimistic Container Forecast	3,310,992	4,286,345	6,599,680	10,176,190	15,711,148	24,284,870
Container Exports Tons						
Base Container Forecast	1,725,009	1,940,561	2,453,431	3,048,415	3,756,221	4,663,559
Probable Container Forecast	1,725,009	2,055,506	2,753,265	3,688,401	4,941,822	6,622,059
Optimistic Container Forecast	1,725,009	2,226,679	3,412,867	5,240,170	8,058,221	12,408,365
Container Imports TEUs Including Empties						
Base Container Forecast	277,904	307,232	396,364	498,205	608,794	750,851
Probable Container Forecast	277,904	330,688	442,010	591,088	790,903	1,059,019
Optimistic Container Forecast	277,904	359,768	553,935	854,125	1,318,694	2,038,317
Container Exports TEUs Including Empties						
Base Container Forecast	270,420	304,211	384,611	477,884	588,843	731,081
Probable Container Forecast	270,420	322,231	431,614	578,211	774,703	1,038,104
Optimistic Container Forecast	270,420	349,064	535,017	821,473	1,263,244	1,945,192
Total Container TEUs Including Empties						
Base Container Forecast	548,324	611,443	780,975	976,088	1,197,636	1,481,932
Probable Container Forecast	548,324	652,919	873,625	1,169,299	1,565,606	2,097,123
Optimistic Container Forecast	548,324	708,833	1,088,952	1,675,598	2,581,937	3,983,510

Table 3-37B
General Cargo and Fluids Forecasts

General Cargo Base	2002	2005	2010	2015	2020	2025
General Cargo, Other, RoRo and Unknown Exports	614,743	601,326	633,192	667,659	698,582	734,424
General Cargo, Other, RoRo and Unknown Imports	1,403,256	1,477,980	1,705,931	1,967,772	2,232,502	2,559,538
Total General Cargo, Other, RoRo and Unknown Tons	2,017,999	2,079,307	2,339,123	2,635,431	2,931,085	3,293,961
General Cargo Probable						
General Cargo, Other, RoRo and Unknown Exports	614,743	630,171	657,317	686,476	717,953	752,116
General Cargo, Other, RoRo and Unknown Imports	1,403,256	1,532,049	1,773,820	2,054,215	2,379,492	2,756,945
Total General Cargo, Other, RoRo and Unknown Tons	2,017,999	2,162,220	2,431,137	2,740,690	3,097,445	3,509,061
General Cargo Optimistic						
General Cargo, Other, RoRo and Unknown Exports	614,743	631,911	662,305	695,239	731,148	770,567
General Cargo, Other, RoRo and Unknown Imports	1,403,256	1,546,832	1,819,906	2,141,790	2,521,338	2,969,041
Total General Cargo, Other, RoRo and Unknown Tons	2,017,999	2,178,743	2,482,211	2,837,029	3,252,486	3,739,607
Fluids Base	2002	2005	2010	2015	2020	2025
Base Product and Tanker Exports	96,095	101,039	111,605	123,594	135,675	149,471
Base Product and Tanker Imports	834,203	928,966	1,135,926	1,348,683	1,552,045	1,789,944
Base Total Product and Tanker Tons	930,298	1,030,005	1,247,530	1,472,277	1,687,720	1,939,415
Fluids Probable						
Probable Product and Tanker Exports	96,095	102,511	114,182	127,194	141,703	157,880
Probable Product and Tanker Imports	834,203	932,840	1,123,864	1,354,062	1,631,478	1,965,810
Probable Total Product and Tanker Tons	930,298	1,035,351	1,238,046	1,481,256	1,773,181	2,123,690
Fluids Optimistic						
Optimistic Product and Tanker Exports	96,095	103,242	116,366	131,176	147,887	166,743
Optimistic Product and Tanker Imports	834,203	944,257	1,160,928	1,427,390	1,755,099	2,158,154
Optimistic Total Product and Tanker Tons	930,298	1,047,499	1,277,294	1,558,565	1,902,986	2,324,898

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4. Existing Facilities and Capacity

4.1 Current facilities

In this section, an inventory of current facilities is developed based on the following primary sources: Site visits conducted in March and December 2003; and the port cadastre from Apiver, 2004. A photographic record using digital photos was also developed on the site visits for the various port facilities. Subsequently, considering engineering, technical and operational factors, the capacity of the facilities to accommodate the various types of cargo is evaluated. The capacity evaluations focus on the container, dry bulk, auto and liquid bulk cargoes. Capacity is also available for multi-purpose general cargo at the public berths.

Figure 4-1 below provides an overview of the existing facilities at the Port of Veracruz. Figure 4-2 shows the concessions areas.

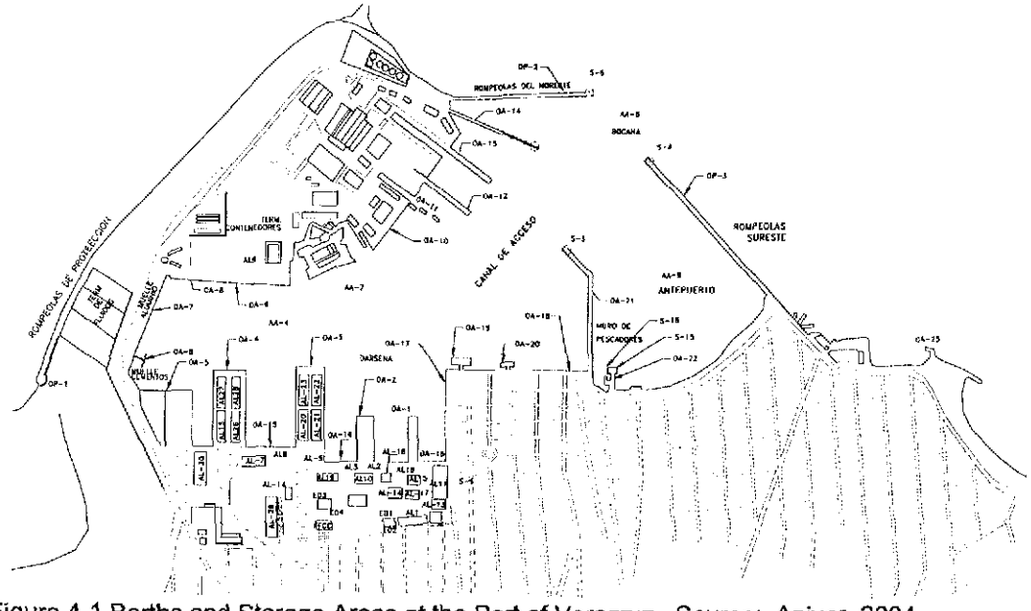

Figure 4-1 Berths and Storage Areas at the Port of Veracruz. Source: Apiver, 2004

As shown on the following table, the port has controlling depths of 13 m in the port entrance and 12 m in the principal navigation channels and turning basins. The turning basin has a maximum diameter of 400 m. There are plans to enlarge the turning basin. However, the historic fort of San Juan de Ulua is expected to require sheetpile bulkhead protection, and limits the space available for dredging a larger basin.

Water areas

Name	Location	Reference Location	Length m	Area m2	Width of Base M	Depth m	Max. Diameter Turning Basin	Dates of Inventory	Observations
Approach channel		AA-1	1100	165,000	150	-13		Nov. 99	
Basin No.1		AA-2	420	54,600	130	-10		Nov. 99	
Basin No.2		AA-3	420	60,900	145	-10		Nov. 99	
Basin No.3		AA-4	365	36,500	100	-10		Nov. 99	
Basin No.4		AA-5	370	85,100	230	-10		Nov. 99	
Mouth		AA-6	900	75,000	150	-13		Nov. 99	
Turning Basin		AA-7				-12	400	Nov. 99	
Interior Navigation Channel		AA-8	1100	220,000	200	-12	200	Nov. 99	
Anteport		AA-9		510111		-9		Nov. 99	

Source: Apiver, 2004

The port has 26 berths, as outlined in the following table. The principal berths used for cargo handling are:

Pier 1 (Berths 1 South and 1 North): Used for automobiles, general cargo and dry bulks.

Pier 2 (Berths 2 South and 2 North): Used for general cargo and dry bulks. The Port plans to extend the pier from its present length by about 20 m.

Pier 4 (Berths 4 South, 4 East and 4 North): Used for general cargo and dry bulks.

The Port has initiated construction of Pier 5 between Piers 4 and 6. The Port also plans to shorten Pier 6 and reduce its width. Pier 5 will provide 14m depths alongside.

Pier 6 (Berths 6 South, 6 East and 6 North): Used for general cargo and dry bulks. Berth 6 South is equipped with hoppers and a dual conveyor system along its south face, connecting to TCE, a grain terminal.

Berth 7 South: Used for general cargo and dry bulk.

Multipurpose Wharf: Situated along Berth 7 East. Containers and heavy lift cargo can also be handling using a multipurpose crane for CICE.

Cement Wharf: Situated between Berth 7 and the Grain and Liquids Jetty

Grain and Liquids Jetty (Espigon Wharf): The jetty includes pneumatic unloading to the Cargill grain terminal on one side, as well as liquid bulk handling to the Vopak and Astro liquid bulk terminals on the other side. The jetty can be seen in Figure 4-2.

Container wharf: The container wharf adjoins the ICAVE terminal. The Port is planning to extend the wharf approximately 50 m. The adjoining historic fort limits the extent to which the wharf can be lengthened.

Name	Reference Location	Year of Const.	Length (m)	Width(m)	Length Berth. (m)	Height (m)	Depth (m)	Operating Entity	Use
Fiscal Pier No.1	OA-1	1890	200.5	23.5	180	2.75	-10	A.P.I.	General Cargo
Fiscal Pier No.2	OA-2	1952	182.4	66.6	431	2.75	-10	A.P.I.	General Cargo
Terminal Pier No.4	OA-3	1895	314.5N 380.5S	100.2	795	3.23	-10	A.P.I.	General Cargo
Pier No. 5		2005 U.C.					-14		
Pier No. 6	OA-4	1952	302.2	120	724	2.53	-10	A.P.I.	General Cargo
Wharf No.7 South	OA-5	1952	243.7		240	2.5	-10	A.P.I.	Liquid, it, Agricultural Bulk
Multi-Use Terminal Wharf (T.U.M)		1998	250	23	210	2.5	-12	A.P.I.	General Cargo
Cement Wharf	OA-6	1952	1 platform of 15 x 14	30	178	2.54	-10	Cements Veracruz	Mooring
Jetty for handling of Grains, Alumina and Liquid	OA-7	1998	200	20	180	2.5	-12	Companies of Liquid, Grains and Aluminum	Mineral bulk, grains and liquids

Berthing Works
Source: Apiver, 2004

Berthing Works

Name	Reference Location	Year of Const.	Length (m)	Width (m)	Length Berth (m)	Height (m)	Depth (m)	Operating Entity	Use
Container Wharf	OA-9	1981	507.6	20.7	507	2.4	-12	ICAVE	Containers
West Central Marginal Wharf	OA-10	1982	74	20	74	2.25	-10	Naval yards of the Gulf	Ship Repair
East Central Marginal Wharf	OA-11	1980	223	20	223	2	-7	(Astilleros Navales del Golfo) Naval yards of the Gulf	Ship Repair
Floating Repair Wharf	OA-12	1982	252	20	500	2.25	-10	Naval yards of the Gulf	Ship Repair
Enlistment Wharf (Muelle de Alistamiento)	OA-13	1982	215	20	400	2.15	-8	Naval yards of the Gulf	Ship Repair

Source: Apiver, 2004

Berthing Works -- continued

Name	Reference Location	Year of Const.	Length (m)	Width (m)	Length Berth (m)	Height (m)	Depth (m)	Operating Entity	Use
Pemex Jetty	OA-14	1975	300	27	180	3.3	-12	PEMEX	Fluids
Pier II-TO	OA-15	1908	460	20	320	3	-5	A.P.I.	Military
Pier II-B	OA-16	1908	507	20	400	2.5	-5	A.P.I.	Military
Pier II-C	OA-17	1908	360	16	360	2.2	-7	A.P.I.	Tourist
Pier II-D	OA-18	1908	600	9	584	2.2	-9	A.P.I.	Small craft
Tourism Jetty	OA-19	1910	67	11	67	2.1	-10	Private	Mooring

Source: Apiver, 2004

Berthing Works -- continued

Name	Reference Location	Year of Const.	Length (m)	Width (m)	Length Berth. (m)	Height (m)	Depth (m)	Operating Entity	Use
Armada Jetty	OA-20	1942	61	15	45	2.1	-9	Secretariate of Navy	Rob
Wall of Pescadores	OA-21	1882	600	10	200	2.5	-9	A.P.I.	Tourist Military
Yacht Club of Veracruz	OA-22		110	9.5	114	2.6	-3	Yachts Club of Veracruz	Tourist
Fishing Jetty	OA-23	1976	30	6.45	51	1.94	-3.5	Coop. Fishing	Fishing
Nautical School Jetty	OA-24		82	7	82	1	-2		Passage
4 Fishing wharves	OA-25	1980	90	1.9	120	1	-1.5	Public use	Fishing

Source: Apiver, 2004

Berthing Works -- continued

Name	Reference Location	Year of Const.	Length (m)	Width (m)	Length Berth. (m)	Height (m)	Depth (m)	Operating Entity	Use
Quay of the Floating Dike	OF-26	1982	30	8	188	2	-12	Navy of Veracruz	Repairs

Source: Apiver, 2004

The Port has extensive storage areas, both open and enclosed, as outlined below.

Storage Areas

Name	Location	Dimensions m	Entity that operates it	Total Area M2	Useable Area m2	Capacity	Use
Playa Yard TO		28.81 x 20.30	A.P.I.	584.84	584.84		General Cargo
Playa Yard B		76.82 x 20.30	A.P.I.	1559.45	1559.46		General Cargo
Playa Yard C		80.98 x 20.30	A.P.I.	1643.89	1643.89		General Cargo
Playa Yard C - 1		50.10 x 2.00	A.P.I.	99.8	99.8		General Cargo
Playa Yard C - 2		49.65 x 3.00	A.P.I.	150.3	150.3		General Cargo
Playa Yard C - 3		50.10 x 2.00	A.P.I.	99.8	99.8		General Cargo
Playa Yard D		124.0 x 20.3	A.P.I.	2517.2	2517.2		General Cargo
Playa Yard E		136.1 x 36.0	A.P.I.	4899.6	4899.6		General Cargo
Playa Yard F		92.0 x 36.0	A.P.I.	3312	3312		General Cargo
Playa Yard G		23 x 38	A.P.I.	874	874		General Cargo
Playa Yard G - 1		92 x 11.70	A.P.I.	1076.4	1076.4		General Cargo

Source: Apiver, 2004

Storage Areas -- continued

Name	Location	Dimensions m	Entity that operates	Area Total m2	Area Useful m2	Capacity	Use
Playa Yard G -2		92 x 3.70	A.P.I.	340.4	340.4		General Cargo
Playa Yard G - 3		32.60 x 5.70	A.P.I.	185.82	185.82		General Cargo
Playa Yard Linda		Irregular	A.P.I.	39717.7	39717.7		General Cargo
Playa No. 3		Irregular	A.P.I.	5516.85	5516.85		General Cargo
Yards of the Multi-Use Terminal (T.U.M.)		243.70 x 250.00	A.P.I.	60925	60925		General Cargo
Playa among Processes		Irregular	A.P.I.	2175.39	2175.39		General Cargo
Container Yard	AL-9		A.P.I.	255,036	3,525.80		General Cargo
Efrén Cervantes Altamirano Shed	AL-10	73.45x 48.0	A.P.I.	3525.6	3525.6		General Cargo
Shed for Pallets Scheme	AL-5		A.P.I.	4639	3711		General Cargo
Autos arehouse (SSAMexico)	AL-11		O.P.G.	11386.3			Vehicles
Transit Shed No.1	AL-12	49.65 x 49.65	A.P.I.	2465.12	1725		General Cargo
Transit Shed No.2	AL-13	49.65 x 49.65	A.P.I.	2465.12	1725		General Cargo
Transit Shed No.4	AL-14	50.1 x 49.65	A.P.I.	2487.46	1741		General Cargo
Transit Shed No. 5 (D AND M OR L I D TO)	AL-15	55.3 x 36.8	A.P.I.	2,035	1,400		General Cargo
Transit Shed No.6 (D AND M OR L I D TO)	AL-16	55.3 x 36.8	A.P.I.	2,035	1,386		General Cargo

Source: Apiver, 2004

Storage Areas -- continued

Name	Location	Dimensions m	Operating Entity	Total Area M2	Usable Area m2	Capacity	Use
(DEMOLISHED)	AL-16	55.3 x 36.8	A.P.I.	2,035	1,386		General Cargo
Transit Shed No.7	AL-17	50.1 x 22.7	A.P.I.	1,137	739		General Cargo
Transit Shed No.8 (DEMOLISHED)	AL-18	37 x 33	A.P.I.	1,247	784		General Cargo
Warehouse Benito Juárez (Warehouse 10)	AL-19	88.2 x 20.9	A.P.I.	1843.38	1290		General Cargo
Transit Shed No.11	AL-20	150 x 23.5	A.P.I.	3,525	2467		General Cargo
Transit Shed No.12	AL-21	150 x 23.5	A.P.I.	3,525	2,176		General Cargo
Transit Shed No.13 (TO BE DEMOLISHED)	AL-22	122.6 x 24.3	A.P.I.	2,979	2,303		General Cargo
Transit Shed No.13-to. (TO BE DEMOLISHED)	AL-23	123 x 23	A.P.I.	2,829	1,980		General Cargo
Transit Shed No.14	AL-24	108.4 x 16.75		A.P.I.	1815.7	1271	
Transit Shed No.15 (DEMOLISHED)	AL-25			A.P.I.			
Transit Shed No.16 (IN REHABILITATION FOR WAREHOUSE OF DANGEROUS GOODS)	AL-26	107.8 x 34.9	Flagstones, piles, isolated half-boots of concrete, wall of partition,	A.P.I.	3762.22	2633	
Transit Shed No.17 (DEMOLISHED)	AL-27		A.P.I.				General Cargo
Transit Shed No.18	AL-28	117.85 x 34.90	A.P.I.	4112.96	2879		General Cargo
Warehouse No.19 Stationary Center	AL-29	149.75 x 41.20	A.P.I.	6169.7	4,319		General Cargo
Transit Shed No.20 (DEMOLISHED)		66 x 20	A.P.I.	1,354	950		General Cargo

4.1.1 Terminals and Concessionaires

The following terminals and concessionaires operate at the Port of Veracruz. Visits were conducted to these concessionaires: Cargill, Apasco, Astro, CICE, Golmex, ICAVE, TMM, SSAMexico, TCE, Vopak and TAMSA.

Cargill de México, S.A. de C.V. :
Specialized port cargo terminal for public use for handling grains and other raw materials, loading, unloading and storage, stowage and transportation of agricultural bulks.

Almexa Aluminio, S.A.de C.V. :
Specialized port terminal for handling aluminum, its raw materials and derivatives, as well as loading, unloading, stowage and transportation of any other minerals, their raw materials and derivatives, as well as cargo which is compatible with mineral bulks.

Cementos Apasco, S.A. de C.V. (APASCO):
Specialized port terminal for handling and storage of cement and raw materials, loading, unloading, storage, stowage, cabotage and transportation of its products, as well as the handling and storage of diverse related materials such as plaster, clinker, and blast furnace ash from coke and coal, among others.

Grupo Industrial Astro, S.A. de C.V.(I Y II) (ASTRO):
Specialized port terminal for receiving, storage and the handling of fluids and bulk liquids (except petroleum and its products), in cabotage and international traffic, and / or parking and maneuvers of tanker trucks used in the handling of fluids.

Corporación Integral de Comercio Exterior, S.A. de C.V. (CICE):
Port terminal of public use, for handling of general cargo, agricultural bulks, minerals and perishables, containerized cargo as well as storage of empty, full and refrigerated containers, loading, unloading, storage, stowage and transportation inside the installation, repair service, cleaning of containers, storage of goods and of full and empty containers, and the port services of receiving, loading, unloading and dispatch of unitized, breakbulk and agricultural or mineral bulk merchandise in general, its storage, as well as its stuffing and stripping conventional or refrigerated containers.

Compañía Integral de Fumigaciones, S.A. de C.V. (CIF):
Handling, storage and custody of goods in foreign commerce, delivery, receiving and storage, stuffing and stripping containers and stowage of merchandise in general, except fluids.

Fire Late, S.A. de C.V. (FIRE LATE):
Weighing services for trucks and railcars.

Almacenadora Golmex, S.A. de C.V.(GOLMEX):
Handling and storage of cargo in general (except fluids), agricultural bulks, minerals, perishables, containerized cargo, consolidation and deconsolidation, as well as storage of containerized cargo and container repair.

Internacional de Contenedores Asociados de Veracruz, S.A. de C.V. (ICAVE):
Specialized port cargo terminal of public use for container handling, receiving, loading, unloading, stuffing, stripping, storage and dispatch.

SSAMéxico (from TMM Puertos y Terminales, S.A. de C.V.):
Handling of automotive vehicles inside the specialized installation and in the process of unloading from land transport vehicles / handling, storage and custody of goods in foreign trade / receiving, loading / unloading and dispatch of unitized merchandise in general, breakbulk, agricultural or mineral bulks and its transportation to storage areas, as well as container stuffing / stripping.

Reparación Integral de Contenedores, S.A. de C.V. (RICSA):
Container repair, maintenance and remodeling.

Terminales de Cargas Especializadas, S.A. de C.V. (TCE):
Specialized port cargo terminal of public use, mechanized for export and import of diverse agricultural bulk products, fluids, and bagged import and export cargo, loading / unloading, storage, stowage and transportation.

Terminal Marítima Especializada, S.A. de C.V.(TME):
Specialized port cargo terminal of private use for storage, handling and distribution of liquid and bulk latex, its raw materials and derivatives, as well as services to third parties under contract. Handling and storage, packaging and distribution of liquid products, solids and chemicals, liquid and bulk raw materials, greases, vegetable oils, minerals and lubricants, tallow, paraffin and latex.

Talleres Navales del Golfo, S.A. de C.V.(TNG):
Used as a shipyard, dry dock and floating dock, as well as in other activities related with the metalworking industry and in the production of capital goods.

Vopak Terminals México, S.A. de C.V. and Vopak Terminals, S.A. de C.V.:
Specialized port cargo terminal of private use for storage, handling and distribution of liquid and bulk latex, its raw materials and derivatives, as well as services to third parties under contract. Handling and storage, packaging and distribution of liquid products, solids and chemicals, liquid and bulk raw materials, vegetable oils, minerals and lubricants, tallow, paraffin and latex.

PEMEX Refinación Terminal Maritima (PEMEX):
Port cargo terminal of private use, specialized in loading, unloading and handling of petroleum and petroleum products.

Corporación Portuaria de Veracruz, S.A. de C.V. (CPV):
Handling services for transfer of goods or merchandise, such as loading / unloading, storage, stowage and transportation, port services of storage of empty, full and refrigerated containers, container and general merchandise repair and washing, and the services of receiving, loading / unloading and dispatch of unitized merchandise in general, breakbulk, agricultural or mineral bulks, and its storage, as well as stuffing / stripping conventional or refrigerated containers.

TMM Logistics, S.A. de C.V. (TMM Logistics):
Container repair, maintenance and remodeling.

Club de Yates de Veracruz, A.C.:
Administers the marina and property there, maintaining a 24-hour a day registration of traffic going out to sea, as well maintaining in working order the radio communications equipment, and keeps the daily lists of the crafts going out to the sea.

Corporativo San Angel, S.A. de C.V.:
Fuel supply for trailers, trucks and railcars.

TAMSA Tubos de Acero de México S.A.:
Carries out its own activities for the supervision of its operations for export of steel pipe and tubes and import of raw material and steel pipe and tubes.

Nextel de México, S.A. De C.V.:
Telephone services.

Source: Apiver, 2004

4.2 Container Throughput Capacity

This section of the report will review the various factors to be considered in determining the Port's container throughput capacity and quantify the current container throughput capacity. Two facilities are considered in this section: ICAVE and CICE. A separate subsection has been included at the end of Section 4.2, listing the various assumptions that were used to reach the conclusions that follow.

4.2.1 Capacity Components

To accurately determine the Port's throughput capacity, each of the six capacity components must be considered. This section define each of the components and subsequently, capacities are determined for each of those components which limit or control throughput. The six capacity components include:

1. Berth Capacity
   This element includes the capacity to berth cargo vessels, timely access from the outer marker and water depth. Consideration must also include: adequate length of berth, congestion within *the harbor, turning basins, etc.*

2. Vessel Unloading and Loading Capacity
   This element includes the capacity to unload and load cargo vessels in a timely and reliable manner to insure that the vessel schedule pro forma is maintained. Conventional gantry cranes, designed to provide high speed handling of containers, and efficiently interface with today's larger vessels offer the best productivity.

3. Capacity to move the cargo between the berth and the storage area
   The conventional yard tractor and yard chassis are most commonly used for this purpose, providing flexibility and efficiency. Factors of consideration include travel distance, congestion, outside influences, etc.

4. Cargo Storage Capacity
   Various forms of grounded storage are currently being used in the Port of Veracruz, offering a high storage density while also providing access. This capacity component will consider capacity, access and the ability to deal with surges in volumes which can occur during seasonal peaks. The overall storage capacity, in conjunction with the length of time the average container remains in the terminal (dwell time), will directly affect the terminals throughput capacity.

Movement of Cargo out of Storage
Very similar to component three, the conventional yard tractor is often the most efficient method. Capacity must be adequate to accommodate the overlapping of vessel operation, rail loading, gate as well as intra-terminal needs.

Gate Capacity
Traditionally, the capacity of the terminal gate must accommodate a level of activity equal to twice the berth throughput. This is due to the fact that the traditional import load moves out of the terminal, through the gate, to be delivered to the consignee and then back into the terminal as an empty, where it is cleaned and prepared for delivery to the export shipper. It moves through the gate a second time when it is delivered to the export shipper for cargo loading. This volume of gate activity must be reduced by the number of empty containers (imports and exports) as well as rail traffic.

The Port of Veracruz has two terminal operators handling containers, ICAVE and CICE. ICAVE handles about 85% of the current container activity and CICE handles the remainder. To effectively determine the overall container throughput for the Port it is necessary to determine the individual throughput capacity for each of these terminal operators.

4.2.2 Terminal Description - ICAVE
Internacional de Contenedores Asociados de Veracruz (ICAVE) is a member of the Hutchison Port Holding Group and operates a 507 meter, two berth facility on Berths 8 and 9. In 2002, ICAVE had a throughput of 474,961 TEUs. The 42 hectare terminal is configured with an area of grounded storage immediately behind the ship unloading cranes, used for the storage of loaded containers. Rubber Tired Gantry (RTG) cranes are used for this grounding operation. The layout has adopted the conventional method of aligning the stacks parallel to the berth face, with a total of 18 rows, with each stack being six wide.

The terminal is divided by the rail spur and a narrow corridor connects the loaded storage and berth area from the second and larger portion of the terminal. While the distance is not considered a problem, it could have an impact on operations when a large number of boxes must move between this area of the terminal and the berth, during vessel operations. This second area is used for empty storage, container freight station (CFS) activities, inspections, rail loading, container maintenance, gate operations and other support activities. Containers in this area are grounded either by an RTG or a "top pick" device; both forklifts and reach stackers are used. The area is configured with five RTG rows and three top pick rows.

4.2.3 Terminal Description - CICE
The Corporación Integral del Comercio Exterior (CICE) handles a wide variety of cargoes, including containers. Containers are primarily handled over Berth 7. In 2002 CICE had a throughput of 230,000 TEU, including approximately 20,000 TEUs that were off loaded over the ICAVE berth. The 15 hectare terminal is separated from the berth, making it necessary for containers to move over Port roads. The majority of the container storage area is configured using RTGs, working over 17 rows. In addition, empty containers are stacked using top pick equipment. The remaining portion of the terminal includes a large CFS, an inspection area as well as an office and gate structure.

4.2.4 Terminal Capacity - ICAVE
After visits to the ICAVE terminal and meetings with various parties involved in the Port's operation, three components of the ICAVE terminal's container throughput capacity were considered to be of primary concern. These three components are berth capacity, vessel unloading capacity and container storage capacity. The other elements are not felt to be a restriction. However, it may be necessary to increase the hours of gate operation, as volume grows.

4.2.4.1 Berth Capacity
The current berth length of 507 meters can be considered a two berth facility as long as the average vessel size calling at the ICAVE terminal stays below 240 meters. However, the trend in vessel length is for larger vessels and in time, this berth will be considered a one berth facility if it can not be extended to a length of 600 meters or longer. As noted, the historic fort limits eastward extension of the wharf to about 50 m, which would provide 557 m overall.

Considering the diversity of carriers calling at ICAVE, a berth occupancy of 50% is a reasonable threshold capacity. This would allow seasonal picking to increase toward the 60% level. It should be pointed out that there are some private terminals which service a single carrier or alliance, with a higher occupancy.

However, the number of carriers calling at ICAVE suggests that this would not be practical, leading to congestion and delays which would eventually impact cargo rates.

Under these conditions, berth capacity can be determined to have an annual throughput capacity of 1,000,000 TEU. *This assumes that vessels will arrive at berth and depart in a timely manner.*

4.2.4.2 Vessel Unloading Capacity

ICAVE currently has five gantry cranes, of which four are of a size compatible with Panamax size vessels and one is adequate to handle the largest of the super Panamax vessels. A new crane is scheduled for acceptance in 2004 and the number of cranes used for cargo service will remain at five.

Average cargo production achieved by ICAVE is 30 to 35 boxes per crane hour with an overall rate of 90 boxes per hour for a three crane operation. This is considered very good and reflects the efficiency of the ICAVE terminal operation.

With a berth occupancy of 50% to 60%, we would expect unloading to occur over a shorter period of 45% to 55%. Using a production rate of 90 and 60 boxes per hour, respectively, for a three and two crane operation, the annual throughput for a two berth facility is calculated to be:

90 box/hr x 1.6 TEU/box x 11 hr/day x 7 days/wk x 52 wks = 580,000 TEU/yr
60 box/hr x 1.6 TEU/box x 11 hr/day x 7 days/wk x 52 wks = 380,000 TEU/yr
Total Throughput Capacity 960,000 TEU/yr

This represents 46% of the weekly crane hours, which is theoretically, at the lower end of the berth occupancy range. However, it is does require 4,000 operational hours per crane annually, which is a significant number, requiring a sophisticated maintenance program for the gantry cranes. It will be difficult to exceed this throughput capacity without increasing berth occupancy or increasing terminal productivity.

4.2.4.3 Storage Capacity

The stated storage capacity of the ICAVE terminal is 20,000 TEUs, including loaded and empty containers. The average dwell time, including empties, is ten days for imports and nine days for exports. With this information it is possible to calculate the number of times the import containers will be "turned over" each year.

365 days/yr / 10 days dwell = 36.5 turns / yr

A similar calculation can be completed for export containers,

365 days/yr / 9 days dwell = 40.6 turns / yr

The turn ratio can be applied to the amount of storage for each cargo category to determine the overall throughput.

Imports
10,530 TEU x 36.5 turns / yr = 385,000 TEU / yr
Exports
9,465 TEU x 40.6 turns / yr = 385,000 TEU / yr
Total Throughput Capacity = 770,000 TEU / yr

Cargo dwell time is determined by a variety of factors such as market conditions, carrier requirements, shipper conditions, shipping conference regulations, etc, etc. The terminal operator also plays a role in influencing the dwell time, based in part on unused storage capacity within the terminal. In other words, as the excess terminal storage capacity is "used up," the terminal operator will reduce the dwell time, to the extent possible.

Along the same lines, a terminal operator often has the opportunity to increase storage capacity, either by increasing density within the terminal or adding a supplemental area of outside storage capacity.

With these two factors in mind, it can be calculated that if the dwell time were to be reduced by only one day and the storage capacity were to be increased by 10%, the throughput capacity would be increased to 950,000 TEU / year.

As actual throughput increases significantly from its current levels, additional storage equipment, RTGs and top pick units, will have to be added to insure the same levels of productivity.

4.2.4.4 Overall ICAVE Throughput Capacity

Review of the ICAVE operation suggests that three of the six capacity components will potentially effect or limit the annual throughput capacity. These are the three components explained above,

Berth Capacity
Annual Throughput Capacity 1,000,000 TEU

Unloading Capacity
Annual Throughput Capacity 960,000 TEU

Storage Capacity
Annual Throughput Capacity 770,000 TEU
Expanded Annual Throughput Capacity 950,000 TEU

If the cargo dwell time and storage capacity can not be increased, annual throughput capacity is 770,000 TEU. *However, if the terminal operator can increase storage capacity and favorably effect dwell time the* annual throughput capacity for the ICAVE terminal will be 950,000 TEU.

4.2.5 Terminal Capacity – CICE

Reviewing the CICE operation, there are four components of the terminal capacity of concern: berth capacity, vessel unloading capacity, movement of containers into and out of storage as well as terminal storage capacity. The other elements are not felt to be a restriction. However, it may be necessary to increase the hours of gate operation, as volume grows.

4.2.5.1 Berth Capacity

Berth 7 is CICE's primary container berth and the closest cargo berth to their terminal. There are two berth faces, at right angles to one another. Each berth face is approximately 250 meters in length. Berth 7 is located at the innermost corner of the harbor. While smaller ships with a full compliment of bow and stern thrusters may be able to make this transit without much difficulty, larger vessels (200 meters +) will require special care and tug assistance, especially under windy conditions.

The berth location and length will effectively restrict larger container ships from using this berth. However, the berth capacity is not expected to restrict annual throughput capacity below the capacity constraints set by the vessel unloading or the terminal storage capacity.

4.2.5.2 Vessel Unloading Capacity

The terminal operator has two Gottwald mobile harbor cranes. These Gottwald cranes have been designed particularly for cargo handling. The elevated operator's cab provides good visibility for the operator. A skilled operator can be very effective in the handling of containers. Changing the "grab" allows the cranes to be quickly converted for the handling of a wide variety of other cargo types as well.

The cranes achieve an average production of 23 boxes per hour per crane. Assuming that each crane can work approximately 50% of each week, the throughput would be:

23 box/hr x 1.6 TEU/box x 12 hr/day x 7 days/wk x 52 wks = 160,000 TEU/yr
23 box/hr x 1.6 TEU/box x 12 hr/day x 7 days/wk x 52 wks = 160,000 TEU/yr
Total Throughput Capacity 320,000 TEU/yr

This level of operation requires the consistent, reliable operation of both cranes throughout the year. This is not possible without a sophisticated equipment maintenance program and the support of a strong spare parts inventory. Alternatively, a third crane could be brought in or a portion of the cargo could arrive on self-sustaining vessels.

4.2.5.3 Movement of Containers into and out of Storage

The distance between the berth and the CICE container storage yard is a greater distance than in many of the container terminals throughout the world. This does not mean it will restrict throughput capacity, however it has been listed here since it has the potential to reduce overall productivity if the terminal operator does not apply adequate management resources and equipment. With the proper procedures and equipment, the movement of containers in and out of storage will not reduce or restrict throughput capacity.

4.2.5.4 *Terminal Storage Capacity*

The stated storage capacity of the CICE terminal is 5,164 TEUs, including loaded and empty containers. The average dwell time, including empties, ranges from six and a half to nine days for imports and three to five days for exports. With this information it is possible to calculate the number of times the import containers will be "turned over" each year.

365 days/yr / (6.5 + 9) / 2 days dwell = 47.1 turns / yr

A similar calculation can be completed for export containers,

365 days/yr / (3 + 5) / 2 days dwell = 91.3 turns / yr

The turn ratio can be applied to the amount of storage for each cargo category to determine the overall throughput.

Imports
3,400 TEU x 47.1 turns / yr = 160,000 TEU / yr

Exports
1,764 TEU x 91.3 turns / yr = 160,000 TEU / yr
Total Throughput Capacity = 320,000 TEU / yr

As actual throughput increases significantly from its current levels, additional storage equipment, RTGs and top pick units, will have to be added to insure the same levels of productivity.

4.2.5.5 Overall CICE Throughput Capacity

Review of the CICE operation suggests that there are two areas of concern. The berth location and length will limit the size of vessels that can be serviced by CICE however, this is not felt to be a greater restriction on throughput capacity than unloading capacity or storage capacity. The second concern is the travel distance between the berth and the container storage area. As mentioned above, with the appropriate amount of resources this concern can be managed.

Two of the six capacity components will potentially affect or limit the annual throughput capacity. These are the two components explained above,

Unloading Capacity
Annual Throughput Capacity 320,000 TEU

Storage Capacity
Annual Throughput Capacity 320,000 TEU

The **Annual Throughput Capacity** for the CICE terminal is 320,000 TEU.

4.2.6 Port Throughput Capacity

The terminal operations of ICAVE and CICE are separated from one another sufficiently to insure that activities in one terminal do not interfere with the activities in the other terminal. On this basis the individual capacities can be combined to determine the Port's overall container throughput capacity.

ICAVE	770,000 TEU / year
CICE	320,000 TEU / year
Total Throughput Capacity	1,090,000 TEU / year

4.2.6.1 Assumptions

In discussions with various parties in the Port as well as review of recent reports, the following information was obtained and used in the preparation of this report.

ICAVE Terminal

- Wharf length 507 meters, 2 berths
- ICAVE handles about 85% of the container volume
- Storage capacity 20,000 TEU (reportedly this can be increased)
- Vessel handling rate of 30-35 boxes / crane hr
- A three crane operation has an overall rate of 90 boxes / hr
- 5 cranes, four are Panamax and one is super Panamax
- 1 crane to arrive in 2004
- Average dwell time is 10 days for imports and 9 days for exports
- Cargo is 50 / 50 imports and exports, with 50% of the exports being empties
- There are 198 reefer plugs
- 13 RTGs, 5 reach stackers, 6 empty handlers
- Current berth occupancy is 30%, assuming 2 berths
- Yard utilization is currently 45%
- Current box ratio is 1.6 TEU / box
- The terminal area is 42 ha
- There are two rail spurs within the terminal
- Large cargo inspection area
- Large CFS, near the inspection area
- Container repair area
- Yard and gate work 24 hours a day
- The terminal works 3 shifts
- Thursday, Friday and Saturday are the busiest days

CICE Terminal

- CICE handles about 15% of the container volume
- CICE handles a wide range of cargoes, including containers
- Containers are handled over jetty 2 & 7
- A small portion of the containers moving through CICE's yard are handled over the ICAVE berth
- The berth cranes operates at 22-24 containers / hour / crane
- CICE has two modern Gottwald mobile cranes to unload vessels
- CICE has five yard cranes (RTG), Mi-Jack Travelift
- Yard production is 124 moves / crane / 8 hours
- The terminal operates 24 hours / day
- The terminal has 36 reefer points, reefers are stacked 3 high

- Yard capacity is 5,164 TEU
- The terminal has a large CFS, 6,750 m2
- The terminal has a large open inspection area
- Average dwell time is 6.5 to 9 days for imports and 3 to 5 days for exports

4.3 Agricultural Dry Bulk Throughput Capacity

This section of the report will review the various factors to be considered in determining the agricultural dry bulk throughput capacity of the Port of Veracruz and quantify the actual agricultural dry bulk handling capability (annual throughput). A separate subsection has been included at the end of Section 4.3, listing the various assumptions that were used to reach the conclusions that follow.

4.3.1 Capacity Components

To accurately determine the Port's throughput capacity, each of six capacity components must be considered. This section will define each of the components and subsequently, capacities will be determined for each of those components which limit or control throughput. The six capacity components include:

1. Berth Capacity
   This element includes the capacity to berth cargo vessels and timely access from the outer marker and water depth. Consideration must also include adequate length of berth, congestion within the harbor, at turning basin and at the entrance channel.

2. Vessel Unloading and Loading Capacity
   This element includes the capacity to unload and load cargo vessels in a timely and reliable manner to insure that the vessel's schedule is maintained. Conventional grab cranes, designed to provide adequate handling of bulk material, designed to interface with today's larger vessels offer the best productivity and flexibility for different bulk materials. One terminal operator for agricultural products is employing suction-type unloaders for grains.

3. Capacity to move the bulk material from the berth to the storage area
   Many of the existing berths rely on shuttle trucks to move bulk material into or from the storage area. This is acceptable for low to medium annual throughput, providing flexibility and efficiency. For higher throughput and longer distances belt conveyors are utilized. Factors of consideration include travel distance, congestion and outside influences.

4. Bulk Material Storage Capacity
   Forms of ground storage currently being used in the Port of Veracruz include storage silos and flat storage buildings. This component will consider capacity and access. The overall storage capacity, in conjunction with the length of time the average consignment remains in the terminal (dwell time) will directly affect the terminal's throughput capacity.

5. Movement of Cargo out of Storage
   Bulk material has to be reclaimed from the storage silos and flat buildings with reclaiming feeders of adequate capacity. In the case of imported material, reclaimed bulk material has to be loaded into trucks and railcars with adequate truck loading and rail car loading facilities. In the case of exported material, reclaimed bulk material has to be transferred to the berths via shuttle trucks or via belt conveyors, similar to component 3.

Gate Capacity
Traditionally, the capacity of the terminal gate must accommodate a level of activity equal to twice the berth throughput. This is due to the fact that the traditional import load moves out of the terminal by train or truck, through the gate, to be delivered to the consignee and then back into the terminal as an empty train or truck, where it is cleaned and prepared to receive the next loading.

The Port of Veracruz has two terminal operator concessionaires handling agricultural bulk material, Cargill and TCE. Total agricultural bulk amounted to 5,919,648 tons in 2002, which represented 38% of the total port traffic. Cargill handled about 30.5% of the imported agricultural bulk and TCE handled the remainder. To effectively determine the overall throughput for the Port, it is necessary to determine the individual component capacities for each of these terminal operators.

Data regarding major port closures were examined for years 2001, 2002 and 2003. It was concluded that on average the port was closed 15 days per year mostly due to severe weather conditions. Thus it can be concluded that the port is available 350 days per year.

From the APIVER port operation data, it was learned that in 2002 the port unloaded 218 vessels of agricultural bulk. Due to high port occupancies 143 of 218 vessels had to wait at anchorage for a total of 8,416 hours; 7182 hours thereof were accounted as waiting for an available berth, which is an average of 50.2 hours per vessel. The remaining waiting hours were due to bad weather (279 hours or 2 hours per vessel) and per user's instruction (955 hours or 6.7 hours per vessel).

4.3.2 Terminal Description - CARGILL

Cargill de México, S.A. de C.V. operates a 200 m long, single berth facility on the east face of the Cargill jetty. In 2002, Cargill had a throughput of 1,805,492 tons of agricultural bulk, consisting of up to 20 different grain products, both oleaginous and hard products. These consisted of several types of soya, sorghum, corn, wheat, rice, rice with husk and wheat with husk. The basic commodities are soya, sorghum, corn and wheat.

From the APIVER port operation data, it was determined that in 2002 the Cargill jetty had a 72.1 % occupancy to handle the 1,805,492 tons annual throughput. Based on port closure data of about 15 days per year, we assume that this occupancy is based on 350 days per year and 24 hours per day, the berth was occupied for 0.721 x 350 x 24 = 6,056 hours. The average berth transfer rate then results in 1,805,492 tons / 6,056 hours = 298 tons per hour (tph). In 2002 there were 63 vessels unloading the above annual tonnage, therefore the average vessel cargo size was 1,805,492 tons / 63 = 28,659 tons. On the western face of the jetty, liquids are being handled for Vopak and Astro, as well as alumina for Almexa Aluminio. Terminales Maritimos de Veracruz (TMV or TEMAVE) plans to develop a grain handling terminal in place of the aluminum facility.

The Cargill terminal located at about 250 m± distance from the jetty (this distance was scaled from Figure 5.2.1 of the report prepared by INOPESA for APIVER) is configured with a storage area, consisting of 16 storage silos of 2,000 m^3 each, equivalent to about 25,000 tons total capacity. Each silo could handle one individual client. There is also a flat storage building, with 4 sections. Sections nos. 1 and 2 have a capacity of 10,000 tons each. Sections nos. 3 and 4 have a capacity of 2,500 tons each. Total storage capacity is 50,000 tons.

The storage dwell time for a typical consignment ranges from 15 days to 20 days maximum. The dwell time could be shorter, approximately seven days, if there is no availability of storage. Based on 1.805 million ton throughput in 2002 and 50,000 ton storage space, turnover was 36.1 times and actual dwell time in 2002 was 10.1 days.

The east side of the Cargill jetty is equipped with two rail mounted traveling pneumatic ship unloaders, each designed for an unloading capacity of 250 tph. Total unloading capacity is 500 tph. They unload Handymax vessels of about 40,000 DWT and Panamax vessels up to a size of about 60,000 DWT. However at present draft limitations mandate that Panamax vessels be lightloaded to about 40,000 tons. Maximum vessel dimensions that can be accommodated, are 32.5 m breadth x 220 m LOA. The available

water depth along the jetty face is indicated as 12m allowing maximum vessel draught of 36 feet or 11.0 meters. This is insufficient for this size of vessel, which requires 42 feet or 12.8 meters in order to be berthed fully loaded. At 11m draft the cargo capacity limit is approximately 40 to 45,000 tons. APIVER performs maintenance dredging every two years.

The two 250 tph pneumatic ship unloaders discharge the material to one belt conveyor at the berth, designed for a capacity of 600 tph. The belt conveyor system carries all agricultural bulk to the storage building and silos. Belt scales are incorporated which measure all tonnage coming from the ships.

The terminal is equipped with three rail spurs and three electronic scales for rail cars, designed for a capacity of 150 tons each. There is one scale for trucks of 70 tons capacity. Samples are taken in each railcar and each truck for quality control.

Cargill's own cargo accounts for 98% of the total handled. The remaining 2% is for third parties. About 75% of the domestic movements are by rail. The remaining 25% are by truck. Train sizes have not been indicated at this time. Rail cars are each loaded with 80 to 90 tons of cargo. Truck loads range from 20 to 25 tons.

The labor force consists of 150 operating and administrative personnel. They work three shifts. The jetty, truck loading and train loading all work 24 hours a day.

The Cargill terminal lease was originally for 25 years; there are 11 years remaining.

4.3.3 Terminal Description - TCE

Terminales de Cargas Especializadas, S.A. de C.V. (TCE) handles 13 types of grains, both oleaginous and hard. In 2002 a partial 1,936,922 tons of agricultural bulk was unloaded at berth No. 6 South, 1,297,001 tons at berth No. 4 South and 880,233 tons at other berths in the port area. TCE total in 2002 was 4,114,156 tons consisting of up to 13 different grain products, both oleaginous and hard products. The basic commodities are sorghum, corn and wheat.

Berth No. 6 South is 302.2 m long and reportedly has 10m water depth, providing 30 feet (9.0 m) maximum vessel draught. It is capable to berth Panamax vessels up to 60,000 DWT with 32.5 m breadth and 220 m LOA. However, due to draft limitations maximum cargo capacity is about 35,000 tons.

Berth No. 4 South is 380.5 m long and reportedly has 10m water depth, providing 30 feet (9.0 m) maximum vessel draft. It is capable to accommodate Panamax vessels up to 60,000 DWT with 32.5 m breadth and 220 m LOA partially loaded to 35,000 tons cargo. The berth can also accommodate two smaller vessels simultaneously.

Other berths can accommodate Handysize vessels up to 45,000 DWT.

From the APIVER port operation data it was determined that in 2002 berth No. 6 South had an 84.5% occupancy to handle the 1,936,922 tons annual throughput. If we tentatively assume that this occupancy is based on 350 days per year and 24 hours per day, the berth was occupied for 0.845 x 350 x 24 = 7,098 hours. The average berth transfer rate then results in 1,936,922 tons / 7,098 hours = 273 tph.

Berth No. 4 South had a double occupancy of 66.1 % on the inner side (No. 4SR) and 80.7% occupancy on the outer side (No.4SP) to handle the 1,297,001 tons annual throughput. Based on 365 days per year and 24 hours per day, the berth was occupied for (0.661+0.807) x 350 x 24 = 12,331 hours. The average berth transfer rate then results in 1,297,001 tons / 12,331 hours = 105 tph on each side.

The remaining 880,000 tons were handled at several other berths not entirely dedicated to agricultural bulk. The APIVER port operation data did not indicate at which berths this grain tonnage was handled at what occupancy. If it is assumed that the same shuttle-truck transfer as performed at Berth No.4 South occurred at those locations, it can be suspected that the berth transfer rate was similar to the one at Berth No. 4 South, which was 105 tph.

In 2002 there were 155 vessels unloading the total annual tonnage, therefore the average vessel cargo size was 4,114,156 tons / 155 = 26,543 tons. The cargo sizes vary, averaging 30,000 tons per ship and 10,000 tons per barge.

Cargo unloading is achieved with ship-mounted cranes equipped with clamshell buckets. It was stated by TCE that compared to pneumatic unloading equipment these cause less breakage of the grain and consume less energy. Capacity of the ship cranes is up to 30 tons hook capacity per crane; clamshell buckets range from 5 to 10 cubic yards nominal volume. The unloading rate ranges from 150 to 175 metric tons per hour for each crane. For a Handymax ship, working with 4 cranes, the nominal unloading rate ranges from 600 to 700 tons per hour.

Berth No. 6 South is equipped with two lines of 42" wide belt conveyors, each designed for 1,100 tph receiving product from the clamshell cranes via mobile hoppers. The belt conveyors transport the product to the storage area. Electronic belt scales with 4 cells are utilized to monitor the rate and total tonnage; these have an error of less than 0.2%.

The other berths are not equipped with belt conveyors. Since the storage area of the TCE terminal is separated from the berths, it is necessary to move agricultural bulk from those berths to the terminal via shuttle trucks over Port roads.

The TCE terminal is located on the west side of the Port basin between berths No. 4 and 6. It is configured with a storage area, consisting of a 40,000 ton storage building, with two sections. There are 5 x 5,900 tons storage silos, 1 silo of 4,900 tons and 3 new silos of 7,200 tons each, total 9 silos of about 56,000 tons total capacity. Metallic silos are utilized because they are lighter. Concrete ones would require pile foundations. Two silos of 15,000 tons for molasses were not in use in 2003 and 2004, since there was no molasses transported. Total storage capacity, excluding molasses is 96,000 tons in 11 locations. Based on turnover of storage 2.5 times per month, the storage dwell time for a typical consignment is about 12 days. Based on 4.114 million ton throughput in 2002 and 96,000 ton storage space turnover was 42.85 times and actual dwell time in 2002 was 8.5 days.

The temperature of the grain varies. For instance, wheat may be unloaded at 18 to 20 degrees Celsius, *but reaches 40 degrees after 5 days of storage.*

Samples are taken for moisture and physical properties in the ship, storage and railcars or trucks. The terminal uses international sampling standards.

Truck and railcar scales have 0.2 percent error.
Domestic shipments are 80% by rail and 20% by truck.

Train sizes have not been indicated at this time. Rail cars are each loaded with 80 to 90 tons of cargo. Truck loads range from 20 to 25 tons.

The terminal works in three shifts. The berth, truck loading and train loading all work 24 hours a day.

4.3.4 Terminal Capacity - CARGILL

After visiting the terminal and meeting with various parties involved in the Port's operation, there is concern about three components of the CARGILL terminal's throughput capacity. These three components are berth capacity, vessel unloading capacity and storage capacity. The other elements are not felt to be a restriction. However, it may be necessary to increase the hours of gate operation, as volume grows.

4.3.4.1 Berth Capacity

The current berth length of 200 meters is a single berth facility limited to lightloaded Panamax vessels of 60,000 DWT and 220 m LOA. Water depth at the berth was indicated as 12.0m. Thus at 36 ft or 11 m draft vessel cargo is limited to about 45,000 tons maximum. Only 180 m of the 200 m jetty length are

available for vessel berthing, which makes the unloading of the outer hold of a 220 m long vessel somewhat difficult.

For efficient handling of bulk material, a berth occupancy of 65% is a reasonable occupancy, keeping the ship waiting times at anchorage at an acceptable level without major impact on cargo rates and demurrage costs.

If it is assumed that the berth is unavailable for 15 days per year due to bad weather or other shut-downs, the berth availability results in 350 days x 24 hours which is 8,400 hours. At 65% occupancy the berth is occupied for 0.65 x 8,400 = 5,460 hours average per year.

4.3.4.2 Vessel Unloading Capacity

Cargill currently has two pneumatic unloaders designed for 250 tph each and compatible with Panamax-size vessels.

Average cargo production that has been achieved in 2002 was 298 tph for the two unloaders based on overall berth occupancy of each vessel from berthing to de-berthing, including separation time between departing and approaching vessels. This is considered above average for this type of unloading operation, considering unloading data at other ports.

Using a production rate of 298 tons per hour for a two-unloader operation, we can calculate the annual throughput limit for a single berth facility to be

298 tons per hour x 5,460 hours per year = 1,627,000 tons/yr

It will be difficult to exceed this throughput capacity without increasing the 65% berth occupancy or providing additional vessel unloading capacity.

4.3.4.3 Storage Capacity

The stated storage capacity of the Cargill terminal is 50,000 tons. The present average dwell time for 1.8 million tons throughput, was calculated as 10.1 days and a possible minimum of 7 days was indicated. With this information it is possible to calculate the number of times the grain consignments will be "turned over" each year.

365 days/yr / 10.1 days dwell = 36.1 turns / yr
365 days/yr / 7 days dwell = 52.1 turns / yr

The turn ratios can be applied to the amount of storage to determine the overall throughput as follows:

Minimum: 50,000 tons x 36.1 turns / yr = 1,800,000 tons / yr.
Maximum: 50,000 tons x 52.1 turns / yr = 2,600,000 tons / yr.

Thus, that the storage capacity of 50,000 tons is adequate for up to 2.6 million tons of throughput, as long as a minimum 7 day well time can be considered as adequate.

Cargo dwell time is determined by a variety of factors such as market conditions, carrier requirements, shipper conditions, shipping conference regulations, etc.

4.3.4.4 Overall CARGILL Throughput Capacity

Review of the Cargill operation suggests that three of the six capacity components will potentially effect or limit the annual throughput capacity. These are the three components explained above,

<u>Berth Capacity</u>
Annual Throughput Capacity Limit is expected to be in excess of the available unloading capacity.

Unloading Capacity
Annual Unloading Capacity limit results in 1,627,000 tons at 65% berth occupancy.

Storage Capacity
Annual Capacity Range is 1.8 to 2.6 million tons per year.

Overall Annual Throughput Capacity Limit
Based on the above considerations the annual throughput capacity limit for the Cargill terminal will range from 1.6 to 1.7 million tons.

4.3.5 Terminal Capacity – TCE

Reviewing the TCE operation, four components of the terminal capacity are reviewed; berth capacity, vessel unloading capacity, and movement of bulk with shuttle trucks to storage as well as terminal storage capacity. The other elements are not felt to be a restriction. However, it may be necessary to increase the hours of gate operation, as volume grows.

4.3.5.1 Berth Capacity

Berth No. 6 South and Berth No. 4 South are TCE's primary unloading berths. Each berth face has sufficient length (302.2 m and 380.5 m respectively) to accommodate 60,000 DWT Panamax vessels of 32.5 x 220 m. Berth No. 4 South can also accommodate two smaller vessels simultaneously. Due to water depth limited to 10.0 m, vessel cargo is limited to about 35,000 tons maximum. Other berths have been utilized to unload smaller vessels; however, if TCE main operations are dedicated to these two berths, they are considered to be adequate for berthing of Panamax vessels 32.5 m breadth and 220 m LOA not restricting the vessel unloading capacity. For handling of bulk material, a berth occupancy of 65% is a reasonable occupancy, keeping the ship waiting times at anchorage at an acceptable level without major impact on cargo rates and demurrage costs.

If it is assumed that the berth is unavailable for 15 days per year due to bad weather or other shut-downs, the berth availability results in 350 days x 24 hours which is 8,400 hours. At 65% occupancy the berth is occupied for 0.65 x 8,400 = 5,460 hours average per year.

4.3.5.2 Vessel Unloading Capacity

All unloading equipment consists of vessel-mounted cranes equipped with clamshell buckets. Typical unloading rates with four ship-cranes range from 600 to 700 tons per hour total. With efficient operation berth rates of 333 tons per hour could be achieved at No.6 South, which is equipped with two belt conveyors. A berth rate of 2 x 125 tons per hour should be achievable based on shuttle truck operations at berth No. 4 South (double occupancy). One other berth with double occupancy should be dedicated to grain operations as well. This is based on overall berth occupancy of each vessel from berthing to de-berthing, including separation time between departing and approaching vessels. These rates are considered typical for the type of unloading operation, considering unloading data at other ports.

Using the above production rates, the annual throughput limit for each berth facility is calculated to be:

Berth No.6 South: 333 tons per hour x 5,460 hours per year = 1,820,000 tons/yr
Berths No.4SR+4SP: 2x125 tons per hour x 5,460 hours per year = 1,360,000 tons/yr
Other Berth(s): 2x125 tons per hour x 5,460 hours per year = 1,360,000 tons/yr

Total vessel unloading limit for TCE is estimated to be 4,540,000 tons/year

It will be difficult to exceed this throughput capacity without increasing the 65% berth occupancy or increasing terminal productivity. Most of the throughput depends on the unloading capabilities of the geared vessels.

4.3.5.3 Movement of Shuttle Trucks into and out of Storage

While the distance between the berths and the storage area is of no concern, congestion of port roads may become an issue. This operation may reduce throughput capacity, if the terminal operator does not apply adequate management resources and equipment. With the proper procedures and equipment, the movement of shuttle trucks in and out of storage will not reduce or restrict throughput capacity.

4.3.5.4 Terminal Storage Capacity

The stated storage capacity of the TCE terminal is 96,000 tons. The present average dwell time for 4.114 million tons throughput was calculated as 8.5 days and a possible minimum of 7 days was indicated. With this information it is possible to calculate the number of times the grain consignments will be "turned over" each year.

365 days/yr / 8.5 days dwell = 42.85 turns / yr
365 days/yr / 7 days dwell = 52.14 turns / yr

The turn ratios can be applied to the amount of storage to determine the overall throughput as follows:

Minimum: 96,000 tons x 42.85 turns / yr = 4,114,000 tons / yr.
Maximum: 96,000 tons x 52.14 turns / yr = 5,005,000 tons / yr.

It is concluded that the storage capacity of 96,000 tons is adequate for up to 5.0 million tons of throughput, as long as a minimum 7 day well time can be considered as adequate.

Cargo dwell time is determined by a variety of factors such as market conditions, carrier requirements, shipper conditions, shipping conference regulations, etc.

4.3.5.5 Overall TCE Throughput Capacity

Two of the six capacity components will potentially affect or limit the annual throughput capacity. These are the two components explained above,

Unloading Capacity
Annual Throughput Capacity Limit is 4,540,000 tons/year

Storage Capacity
Annual Capacity Range is 4.1 to 5.0 million tons per year; 4.5 million tons per year corresponds to 47 turnovers and a dwell time of 7.8 days with 96,000 tons of storage capacity.

Annual Throughput Capacity Limit
Based on the above considerations the annual throughput capacity limit for the TCE terminal will range from 4.5 to 4.6 million tons.

4.3.6 Port Throughput Capacity for Agricultural Products

The terminal operations of Cargill and TCE are separated from one another sufficiently to insure that activities in one terminal do not interfere with the activities in the other terminal. On this basis the individual capacities can be combined to determine the Port's overall agricultural bulk throughput capacity.

CARGILL	1.6 to 1.7 million tons / year
TCE	4.5 to 4.6 million tons / year
Total Throughput Capacity	6.1 to 6.3 million tons / year

4.3.7 Assumptions

In discussions with various parties in the Port as well as review of recent reports, the following information was obtained and used in the preparation of this report.

CARGILL Terminal

- Jetty length 200 meters, one berth used on east face
- In 2002 CARGILL handled about 30.5% of the agricultural bulk volume
- CARGILL throughput in 2002 was 1,805,492 tons
- Occupancy of the CARGILL jetty was 72.1% in 2002
- 63 vessels were unloaded in 2002
- Vessel unloading by two pneumatic unloaders, 250 tph nominal capacity each
- Storage capacity is 50,000 tons in 16 silos and 4 flat storage sections
- Average dwell time was10 days in 2002
- There are three rail spurs within the terminal
- Terminal, storage yard and gate work 24 hours a day
- The terminal works 3 shifts.

TCE Terminal

- Berth length No. 6S = 302.2 m, No.4S = 380.5 m (double occupancy); several other berths were partially used in 2002
- In 2002 TCE handled about 69.5% of the agricultural bulk volume
- TCE throughput in 2002 was 4,114,156 tons
- Occupancy of Berth No.6S was 84.5% in 2002
- Double Occupancy of Berth No4S was 66.1% + 80.7% in 2002
- A total of 155 vessels were unloaded in 2002
- Four ship-mounted cranes operate at 600 to 700 tons per hour total
- Storage capacity is 96,000 tons in 9 silos and 2 flat storage sections
- Average dwell time was 8.5 days in 2002
- Terminal, storage yard and gate work 24 hours a day
- The terminal works 3 shifts.

4.4 Automobile Terminals

4.4.1 Overview

The Port of Veracruz handles 72% of the imports and exports of automotive vehicles. The principal firms involved in this trade in 2002 were Volkswagen, which moved 273,000 units, Ford, which moved 73,000 units and Chrysler, with 33,000 units. The rest of the motor vehicle movements through the port are generated by Toyota, Honda BMW, Audi, Seat, Peugeot, Mitsubishi, Nissan, Renault, Volvo, Land Rover, Porsche, Mercedes Benz, Piaggio, Skoda and Alfa Romeo.

The main terminal handling autos in Veracruz is operated by SSAMexico, which took over operations in 2003 from TMM. The terminal handles 300,000 autos. Of this, 80% are exports and 20% imports. Additional units are handled in the Agemar and Pasha areas.

Some recent developments reported by a concessionaire include:

- **Ford** changed its logistics from rail routing to water routing in 1998. Lincolns are moved from the US to Mexico. Contours and Mystiques are moved from Mexico to the US. Some 50% of the Fords go directly to the dealers. Ford moves some 2,500 units a month directly.

- **BMW and GM** have also started using water routing. The water routing has a lower incidence of damage than the rail routing, according to the concessionaire.

- The **Nissan** auto plant in Aguas Calientes formerly shipped their cars in trilevel rail cars. Now, cars from Aguas Calientes are shipped by sea routing via Baltimore.

- **VW** ships 400,000 cars nationally. The growth rate is 4%. SSAMexico services VW as their cargo handler. The garage at Pier 1 provides an indoor parking for 7,000 VW vehicles, exclusively.

- **Others**: Through the Port of Veracruz, 150,000 cars of other makes are also shipped, with a growth rate of 6-7%.
- **Toyota** is shipping 19-20,000 units, with a growth rate of 3%.

- **Total auto trade**: Of the total auto trade at the Port of Veracruz, 30% is with Europe, and 70% with the US, Canada and the South America. Treaties with Europe could open the market for FIAT and Jaguar. Due to its location on the Gulf Coast, the Port of Veracruz is not a primary routing for Asian motor vehicles.

The terminal also provides Pre-Delivery Inspection (PDI) and Vehicle Processing Center (VPC) services.

The areas where autos are parked or handled are not only yards. There are also receiving and distribution installations for processing. Land is utilized to add value.

The concessionaire commented on the difficulty of expanding their storage area to meet increased demand. According to the concessionaire, the law for concessions limits the right of the concessionaire to increase his concession to an additional 20% of land and only if it is contiguous.

The main berths utilized for handling autos are Pier 1 and Pier 2. Berth 7 East is also serving for auto carriers, especially for more rapid discharging. Berth 7 is also closer to the rail lines, with trilevel access.

The concessionaire envisions growth in auto trade through the Port of Veracruz leading to a doubling of the total tonnage of shipped autos in seven years from the present (2003 volume) to about 570,000 units, equivalent to 770,000 tons.

Present berth time per auto carrier (ship) is about 24 hours. Considering that the car carriers are only partially loaded or unloaded in Veracruz, the average car carrier calling in Veracruz was about 14,000 DWT, a 4,000+ car carrier. The time at berth includes arrival, berthing, formalities, loading/unloading of autos and inactive time.

Car handling averages about 150 tph, or about 120 cars per hour. Thus, a car carrier with about 4,800 cars to be loaded in Veracruz, may require on average 40 hours for loading, and 8 hours for other activities, such as berthing, de-berthing, formalities and any lost time due to bad weather conditions. Thus, effective mooring time per 100 cars is 1 hour. To transport 580,000 units, the total berth time would be 5,800 hours, or 240 days.

At present, of the about 200 days car carriers are in the port, half the time or 100 days are occupied by the activities other then car handling, such as berthing, de-berthing, formalities and other inactive time. The timing of these activities could be substantially compressed in order to improve the efficiency of berth occupancy of the Ro-Ro car carriers. Use of Berth 7E and 1N would satisfy the berth availability requirements. The ratio of projected imports to exports is estimated to be 0.75 to 1.0, thus about 440,000 tons or 326,000 units of the above stated 570,000 units would be exported, and 330,000 tons or 244,000 units imported.

The anticipated growth of the car handling in the port also requires consolidation of activities. SSAMexico, which handles VW cars for export, accomplishes this by parking their cars intended for export in the parking garage adjacent to the Pier 1, and handling their cars exclusively at this location. Other car carriers sometimes dock at Berth 7 East and consolidate cars pre-distribution at the adjacent lot, with the immediate access to tri-level rail auto transporter trains.
However, shipments of other than VW models handled at Pier 1 or 2 have no storage these cars in this area of Piers 1 and 2. These vehicles are kept in lots or rail transporters near Berth 7 in the North section of the port. In order to also be handled at Piers 1 and 2, these non-VW vehicles would need to move

between storage yards in the North section and Piers 1 and 2 on the congested port roads, resulting in inefficiency of car handling.

To achieve an increase of car handling operations at Port of Veracruz, Pier 1 should handle car exports, with facilities for staging all cars for shipment, and their preparation and inspection, as provided by VW in their garage. Imports on the other hand need to go to Berth 7 East since it is close to the car parking lots and trains that could take the cars expediently out of the port, with minimum affect to the traffic on the port's roads.

4.4.2 Berth Capacity for Exports

Since the VW garage is an exclusive facility for this make of cars, other make cars produced in Mexico do not have adequate car parking storage near Pier 1 to make efficient use of this pier. Berthing facilities of Pier 1 have adequate capacity to handle the present and projected increase in exported auto cargo, but adequate storage capacity there exists only for VW. The required occupancy of the Berth 1S would be in order of 4,400 hours or 183 days, with occupancy rate of 50% for the aforementioned 326,000 units of exports. The adjacent berth of the pier would provide the necessary backup.

4.4.3 Storage Capacity for Exports

The enclosed garage near Pier 1 provides static capacity for approximately 7,000 VW vehicles. Export dwell time should not exceed 7 days. Thus, the storage is sufficient for over 350,000 units of annual exports.

4.4.4 Berth Capacity for Imports

On the other hand, Berth 7 East would have the required projected occupancy in auto handling of 3,300 hours or 138 days, an occupancy of about 40% for the aforementioned 244,000 units of imports. This berth is being shared with other commodities and is not always available to car carriers. This is also affected by the use of inefficient container handling equipment in the container handling operations conducted there.

4.4.5 Storage Capacity for Exports

The present capacity of car lots adjacent to Berth 7E (Muelle TUM) is as follows:

a. TMM 95,764 m^2,
b. AGEMAR 21,424 m^2, and
c. PASHA 57,078 m^2.

Considering 24 m^2 per vehicle it translates the parking capacity of the lots approximately as follows: a. 4,000, b. 900, and c. 2,400, or total 7,300 cars. This provides up to 10 days average dwell time with the projected imports. However, dwell time for imported cars should not exceed 7 days. Thus, outdoor capacity is sufficient for 380,000 units of exports.

Thus, the lot capacity could be considered adequate, even if cars are handled longer for customs reasons. The remaining problem involves parking of exports other than VW. If these cars stored at the other part of the port than the shipping wharf, their movements cause congestion on the port roads, and if they brought "just in time" for shipping from outside the port, this does not allow for their proper inspection prior to shipping, and is delaying their loading.

It would be possible to achieve an improvement of the car handling operation there by constructing a deck structure between Pier 1 and Pier 2, with large multi-deck parking garage on. Such facility with Berths 1S and 1E would be primarily dedicated to handling of car exports and 1N (present 2N) dedicated to multi products. Efficiency of this 3- berth facility would be far larger than present four berths of Pier 1 and Pier 2 combined.

Import of cars is adequate at the Berth 7E, which is closer to transportation facilities, open parking lots and the port exit.

4.5 Nonpetroleum Liquids Terminals

4.5.1 Overview

There are two principal terminals in Port of Veracruz which handle non-petroleum liquids. The larger of the two is operated by Vopak Terminals Mexico, S.A. de C.V. Adjacent to the Vopak terminal is the Astro terminal, operated by Grupo Industrial Astro, S.A. de C.V. Both terminals are located at the north end of the port, adjacent to the Jetty Pier ("espigon").

4.5.2 Vopak Liquids Terminal

Vopak has 80 terminals worldwide with 25 million m3 of capacity. Vopak terminals handle chemicals, vegetable oils, greases and diesel.

In Mexico, Vopak has 4 terminals. The largest of them is in Veracruz, with the area of 63,254 m^3: The other terminals are located in Altamira and Coatazacoalcos on the Gulf coast and Manzanillo on the Pacific coast. Their capacity is indicated below:

Port	Tanks	Capacity
Veracruz	88	118,000 m3 in the fiscal area
Altamira	21	16,000 m3 on own property
Coatzacoalcos	17	21,000 m3 on fiscal area
Manzanillo	10	14,000 m3 on API land

The Veracruz terminal of Vopak moves 800,000 tons per year. The concessionaire is a Mexican firm, with a parent company in the Netherlands.

Commodities handled include: acetone, MK, MG, oxyacetylene, some 50 different petrochemicals, sunflower oil, soy oil, cotton oil, and molasses. In addition to the non-petroleum liquids, Vopak handles diesel fuel for PEMEX.

About 98% of the cargo is import cargo. About 85% of the cargo is moved domestically in tank trucks ("autopipas"). The remaining 15% is moved by rail tank car.

Principal destinations for the import cargo include Mexico D.F., Altamira, Tamaulipas and Monterrey. The principal end users of the vegetable oils are the oil industry, for cooking and soaps.

The terminal utilizes the cement wharf, and jetty ("espigon"). Both the cement wharf and the jetty berths have 33-foot draft. These berths can handle ships from 6,000 to 45,000 DWT. Most docking there ships are in the range of 8 to 15,000 DWT.

According to the operator, handling rates are contracted at 80-100 tons per hour and actually range from 200-300 tons per hour for oils. Overall terminal has 14 lines to the berths. There are 9 lines between the cement wharf and the Vopak tank farm, 4 lines between the jetty berth and the Vopak tank farm, and 1 line for molasses between the wharf and the tank farm. In addition to these 14 lines, there are 3 additional lines between the Cement Wharf and Wharves 7-South and 7-East, for a total of 17. However, Wharves 7-South and 7-East are not utilized by Vopak.

The maximum handling rates in the pipelines are as follows:

- 6 in. pipelines - 400 tph
- 8 in. pipelines - 600 tph
- 12 in. pipelines - 1,000 tph

The lines serve 6 chemicals in 5 x 6-in lines (five 6-inch lines) and 3 oils and greases in 1 x 8-in line. The available pipelines and pumping gear can fully load 20 rail tank cars with 80-100 tons, each in about 30 min.

The terminal facilities can also load up to 24 tank trucks with 35-45 tons each, in 30 min, but the complete cycle generally takes about 2 hours due to the paperwork involved.

Measurements are made directly in the tanks on the ship. Before measuring the product in the tanks, it is allowed to rest 24 hours. Saybolt or SGS make measurements aboard.

According to the concessionaire, chemical traffic is expected to increase. Oils traffic is variable. It depends on milling. Some of the oil companies are setting up their own mills, and buying oil seeds. There is competition between oil milled domestically and imported oils.

Water transport also experiences competition from the railroad. With transport of some oils from the United States, it is difficult for water transport to compete. A rail / water / rail routing such as rail to Houston, plus water transport to Veracruz, plus rail in Mexico is often more costly than all rail routings from the origin in the United States to the final destination in Mexico.

The concessionaire reported that there are delays in Veracruz. Some shipping companies, for example Stolt, are said to be afraid of Veracruz because of delays awaiting berths. There are also delays due to adverse weather. Before the jetty was built, there were more queuing delays; however, the situation has improved since its construction. There are also delays and waiting lines in customs. By comparison, according to the concessionaire, the railroad just crosses the border with minimal customs delay.

The procedure is that upon arrival the ship notifies customs, and then unloads. This can be for one import at a time, or multiple imports. The order document (*"pedimento"*) for import has to be submitted. There is a waiting line to leave. A customs agent provides the clearance documents.

4.5.2.1 Berth Capacity

Tankers serving Vopak Terminal presently arrive with an average cargo load of 15,000 tons. For purposes of an assessment of berth capacity, it is assumed that in the future tankers may arrive every 3.5 days with such average size cargo. This would represent roughly a doubling of the current arrival rate for liquid products at the Vopak terminal. The yearly throughput of 104 shipments at 15,000 t would be 1,565,000 t, which is about 200% of the present throughput. Capacities of facilities for this volume will be reviewed herein.

Tanker at the pier berth: Say 5 chemicals are unloaded at the same rate of 400 tph per 6-in diameter line.

Unloading time: (15,000 / 5 x 400)	= 7.5 hours
Docking, undocking	= 1.5 hours
Formalities	= 1.5 hours
Connections	= 0.5 hours
Total	= 11.0 hours

Berth occupancy at future throughput rate (Vopak products only):

100% x (11h x 104 tankers)/ (365 x 24)) = 13%

Before the jetty was constructed, there was a shortage of the berthing space for tankers serving the facility. This lack of berthing capacity was significant factor in queuing of vessels. Presently other factors may cause queuing: formalities, delays in pilotage and towing services and bad weather. Bad weather is a low frequency and only seasonal event, and it is possible that other factors could be addressed by the port administration and customs.

4.5.2.3 Storage Capacity

The present tanks have a capacity of 118,000 m^3. This volume stores about 94,500 t of oil. To achieve the assumed yearly throughput of 1,565,000 t, or approximately double the current level, the average dwell time should not exceed: 365/(1,565,000 t / 94,500 t) = 22 days This dwell time is considered to be achievable, as and when demand warrants turnover in storage tanks to accommodate such annual throughputs.

4.5.2.4 Pipelines and Unloading Capacity

The numbers and sizes of pipelines are adequate at the present time. For the future increase in throughput, some of the 6-inch diameter pipelines may need to be replaced with 8-inch diameter lines. Present pipelines provide for flow of liquids with velocities up to 22 fps (6.7 m/s). The present maximum velocity rates cannot be exceeded.

4.5.2.5 Loading Capacity

For the analysis of the loading capacity of land transport, this evaluation assumed that equal volumes of liquids are to be transported by rail and by truck. If the distribution of cargo to truck and rail remains at 85% and 15%, respectively, the loading time will be greater, but still within the capability of the terminal.

Loading 24 trucks x 40 t (average) = 960 t / 0.5 hour
Formalities 1.5 hours; thus 960 t / 2 h, or 480 tph
Loading 20 rail cars x 80 t = 1,600 t / 0.5 hour
Formalities 1.5 hours; thus 1,600 t / 2h, or 800 tph
Present yearly throughput 800,000 t
Total loading (16hrs/day) 800,000/average 640 tph = 1,250 h, or 78 days

Loading with future throughput of 1,565,000 = 153 days/year
Loading with future expedited formalities of 1 hr = 115 days/year

From this, it can be seen that the present terminal can double its throughput to 1.6 million tpy with only nominal alterations and changes in the procedures.

4.5.3 Astro Liquid Bulk Facility

The Astro terminal handles oils and vegetable and animal greases. The terminal does not handle petrochemicals. The terminal has 14 tanks, with a capacity of 3,100 m3 each. Overall, the capacity is 54,000 m3. Astro has a 20-year concession for this facility that commenced about 5 years ago.

In 2003, Astro expects to handle 200,000 tons per year for the full year. By 2004, the concessionaire's projections envision their handling 250,000 tons. The terminal handles both imports and exports.

The dwell time ranges from 15 days to 3, 4 or 5 months. An average dwell time is 45-60 days. The long dwell time is due to the lower cost of storing the products in the Astro facility tanks than in the facilities of the distributors. Due to limited throughput demand, the Astro facility does not yet have the need to ensure shorter dwell times through higher tariffs or demurrage on storage. A higher throughput through the tank farm could be achieved by reducing the dwell time at the facility.

They have 2 x 8 in. lines (two 8-inch lines).

The cargo is shipped domestically from the Astro terminal by rail and truck. The terminal can load 12 railcars at the same time and 6 tank trucks ("*autopipas*").

Some of the products are currently shipped to or from:

- Industry (Unilever, El Zapote)
- Soya (From USA, New Orleans)
- Sunflower (USA)
- Palm (Honduras, Costa Rica, Malaysia)
- Tallow (Malaysia)

Overall 85% of the trade is with the US.

Of the 14 tanks, 10 are for vegetable oils and 4 for animal greases and oils. The vegetable and animal oils can't be mixed. The tanks are calibrated by SGS. The products are shipped by trucks, that can handle 35-40 tons, or by railroad. The railcars handle 70-80 tons.

Some special temperature requirements for handling of oils are as follows: Palm has to be handled at 50-55 degrees C, while tallow has to be handled at 55 degrees C.

4.5.3.1 Berth Capacity

At present, the Astro facility's throughput is approximately 250,000 tpy. For purposes of the capacity assessment, a doubling of throughput to 500,000 tpy was considered.

Average size of tanker with vegetable oils and greases	= 5,000 dwt
Average number of shipments	= 50
Pumping rate through 2 x 8-in pipelines	= 1,600 tph
Unloading time: (5,000 / 1600)	= 3.5 hours
Docking, undocking	= 1.5 hours
Formalities	= 1.5 hours
Connections	= 0.5 hours
Total	= 7.0 hours

Berth occupancy with future throughput of 500,000 tpy (Astro products only):
100% x (7h x 100 tankers) / (365 x 24) = 8%

4.5.3.2 Storage Capacity

Present tanks have capacity of 54,000 m^3. This volume stores about 43,200 t of oil. To achieve the assumed yearly throughput of 500,000 t, or doubling of current levels, the average dwell time should not exceed: 365/(500,000 t / 43,200 t) = 32 days. This is a significant time to store products for the customers, and is deemed more than adequate. Despite this, the present dwell time is twice as long. However, the present long dwell time can be reduced, thereby making possible handling of 500,000 tpy with the present tankage. By raising the fee for storage, the terminal operator can utilize the available tank volume to serve twice as large a throughput. This would also increase the profit from the available tank volume.

4.5.3.3 Pipelines and Unloading Capacity

The number and size of the existing pipelines are adequate at present and for foreseeable future.

4.5.3.4 Loading Capacity

For loading of land transport, this evaluation assumed the volume of liquids to be transported by rail and by truck to be as follows:

Loading 6 trucks x 40 t (average) = 240 t at 160 tph =1.5 hour
Loading 10 rail cars x 80 t = 800 t at 400tph = 2 hours
Loading at both locations is simultaneous
Formalities 1.0 hour; thus 1,040 t / 3h, or 347 tph
Future yearly throughput 500,000 t
Total loading (16hrs/day) 500,000/average 347 tph = 1,440 h, or 90 days

From this, it can be seen that the present terminal can double its throughput to 500,000 tpy with only nominal alterations and changes in procedures.

4.5.4 Port capacity

Considering the increases in capacity at both Astro and Vopak, the port capacity for nonpetroleum liquids would then be 2.1 million tpy.

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5.0 Infrastructure, Facilities and Equipment Requirements

5.1 Overview

This section provides assessments of the facility requirements for the following cargo handling categories:

- Containers
- Grain
- Minerals
- Automobiles
- Fluids

The infrastructure, facilities and equipment requirements are calculated for the cargo throughput demand forecasts developed in Section 3, focusing on the likely or probable case of demand. These requirements are compared to the facilities available in the port at present, as identified in Section 4, to identify the additional facilities required to accommodate the forecasted demand.

5.2 Container Facility Requirements

5.2.1 Introduction

The existing container capacity at the Port of Veracruz was reviewed and the necessary facility and equipment were defined to meet the forecast growth in container throughput. Section 4.2 briefly reviewed the six "capacity" elements. A computer model was developed based on these six elements, to determine the facility and equipment requirements to efficiently handle the forecast container volume for each of the cargo scenarios considered.

5.2.2 Existing facilities

Containers are currently handled at the Port of Veracruz by two terminal operators, CICE and ICAVE. The CICE facility is separated into two portions: the berth area and the storage area. Vessels are worked at the berth area, with mobile cranes and containers move to and from the storage area, which is a short distance from the berth. This separation provides a number of operational challenges that increase cost, impact security and generally contribute to lower overall productivity when compared to modern terminals designed for efficient container handling.

The ICAVE facility includes a number of conventional high speed container cranes as well as a portion of the ICAVE storage area that is adjacent to the berth. While this terminal offers a number of operational advantages, it is constrained by berth size, as well as by the distance to the empty storage area. As volume continues to grow and vessel size trends toward larger vessels, this terminal will be considered a single berth terminal and will limit the Port's ability to provide adequate facilities to handle increasing volumes and attract new carriers.

It is recommended that, over the longer term, these terminal areas should be used to support growth in other cargo categories, and the existing container operations should be shifted to the new port area. While there may be contractual considerations that will affect the timing of this relocation, a recommendation will be included for each cargo scenario, based on operating efficiency and productive use of the Port's facilities. As container cargo continues to grow, it will become increasingly important for the Port to utilize the Port's facilities with increasing efficiency to ensure the most productive return on their facilities, and that operating costs are not unduly impacted by facility limitations.

5.2.3 New facilities

Subsequent section 6 of this report includes evaluation of the various port locations being considered for development and provide recommendations. In this section, it is assumed that the new container facilities will incorporate the necessary attributes of location, adjacency and size to provide efficient operation over the long term.

Along with the physical characteristics of the new facilities, it is also necessary to consider the methodology to be used to award operational concessions for each terminal. In generally accepted practice, each container terminal is designed to be self sufficient and effective as a single terminal operation. However, as volume grows to support multi-terminal operations, economies of scale offer advantages in equipment needs, labor utilization, and management requirements, while also supporting the cost of computer and various semi-automated systems, increasingly required to maintain a competitive advantage. For these reasons, the Port is encouraged to limit the number of terminal operators, while providing a competitive environment. For each of the cargo scenarios, the following recommendations have been included on the maximum number of terminal operators:

	Recommended Maximum Number of Terminal Operators
Base Case	Two to three operators
Probable Case	Two to three operators
Optimistic Case	Three to four operators

5.2.4 Terminal Size

In section 4.2, the six terminal capacity elements were briefly reviewed as they related to the CICE and ICAVE terminals. Since these elements offer a solid base for determining the size of new container terminals and the quantity of equipment needed to efficiently operate each terminal, they have been included here, in greater detail. The six capacity elements include:

1. ***Berth Capacity***
   This element includes the capacity to berth cargo vessels, timely access from the outer marker and water depth. The ability to locate all of the container capacity along a single berth face and exchange berth usage between terminals will reduce the pressure of increasing berth length. However, a single terminal should have an average berth length of approximately 360 meters to accommodate increasing vessel size. A berth length of 360 meters has been assumed for the model.

   Each berth should be capable of supporting the continuous operation of four cranes. While the model determines the number of gantry cranes based on need rather than the number of berths, the berth structure, electrical supply, etc, should be adequate for a four-crane vessel operation on a single berth.

2. ***Vessel Unloading Capacity***
   This element includes the capacity to unload and load container vessels, in a timely and reliable manner, to ensure that the vessel's schedule pro forma is maintained. Conventional gantry cranes, designed to provide high speed handling of containers, are recommended.

   In line with standards commonly accepted throughout the world, a 100-foot rail gauge is recommended. This provides for an adequate working area under the crane for a multi-crane operation over a single vessel to be safely completed. The cranes shall be of adequate geometry to accommodate an 18-wide container vessel. While a crane of this outreach is adequate to accommodate the largest vessel in service today, it would be prudent to review this standard prior to acquisition. The following criteria are recommended for the container cranes:
   - Capacity (twin lift), 65 long tons (LT)
   - Rail gauge, 100 ft
   - Outreach from wharfside (WS) rail, 178 ft
   - Backreach from landside (LS) rail, 60 ft
   - Hoisting height above rail, 130 ft
   - Clearance between legs, 60 ft
   - Overall length between bumpers, 88.5 ft

- Hoist speed (rated load/empty), 250 / 500 ft /min
- Trolley speed, 780 ft / min
- Gantry speed, 150 ft / min
- Power supply, Cable reel, with fiber optics link

3. ***Capacity to move the cargo between the berth and the storage area***

The conventional yard tractor and chassis are recommended for movement of containers between the berth and the storage area. The yard tractor was selected because it is specifically designed for operation within the terminal, providing greater maneuverability and improved economies of operation over the standard unit designed for over-the-road operation. The tractor also has a hydraulic "fifth wheel," which speeds the operation. The operator's cab is specifically designed with additional windows to improve visibility and safety.

The yard chassis or "bomb cart" is preferred for vessel operations because of its superior durability and many features that enhance cargo operation. The chassis' structure is designed to more effectively accommodate the constant "abuse" of cargo operation, while also incorporating corner guides to assist container placement and easy "bottom" access for placement and removal of IBCs (inter box connectors). Unlike the highway chassis, which is designed for a single container size, the yard chassis can safely accommodate a full range of container sizes without modification or adjustment, including:

- 40-foot container
- 45-foot container
- A single 20-foot container
- Two 20-foot containers, spaced for separate handling
- Twin 20-foot containers, positioned for a "twin lift"

4. *Cargo Storage Capacity*

The method of container storage encompasses a compromise between terminal size, access, labor content, equipment cost and storage density. Containers stored on individual chassis offer the greatest accessibility and simplicity of operation but the lowest storage density and, hence, the largest terminal size, for a given volume. Since container throughput capacity and storage capacity are directly related, the use of chassis for container storage at the Port of Veracruz would prevent the Port from handling the volume that has been forecast.

There are a number of terminal systems in use today that can be used to effectively increase terminal storage capacity by increasing storage density. There are three systems that should be considered for Veracruz. These have been listed below along with relative storage densities. It should be pointed out that the actual number of TEUs (twenty foot equivalent units) per acre (or per hectare) will vary, based on the geometry of the storage area as well as local operating practices. However, the relative relationship between alternative storage methods will remain the same.

Storage Method	**Storage Density TEU / acre (TEU / ha)**
Chassis	65 (163)
Top Loaders (loaded containers)	160 (400)
Straddle Carriers	250 (625)
Rubber Tired Gantry Crane (RTG)	290 (725)

Because of the higher storage density as well as the greater capacity to accommodate peak volumes, the Rubber Tired Gantry crane (RTG) is recommended for the Port of Veracruz. The size and performance of the RTG has been defined to ensure productive operations for both the yard storage activity as well as rail loading. The following criteria are recommended for the RTGs:

- Capacity 40 LT
- Lift height (4+1) 50 ft
- Span (6 wide + truck lane) 77 ft
- Hoist speed (rated load/empty) 75 / 180 ft / min
- Trolley speed 230 ft / min
- Gantry speed 300 ft / min
- Automatic / guided steering for the gantry motion

The RTGs will be used for storage of loaded containers, the loading / unloading of the rail cars and can also be used for storage of empties. However, since empty containers can be treated on a group basis, according to their size, it is not necessary to store empties with the same degree of accessibility as loaded containers. To further increase the storage density within the terminal, it is recommended that empty containers be "block" stowed using "empty handlers." By storing empties four high, in this configuration, it is possible to achieve a storage density of up to 430 TEU / acre (1,075 TEU / ha), using a piece of equipment that is considerably less expensive than an RTG. The empty handler is a forklift with a special spreader, capable of picking an empty container from the "side" rather than the top. The empty handler specifications should include the following:.

- Lift capacity 17,500 lbs
- Telescoping spreader 20 to 45 ft

- Maximum lift height (5 high) 48 ft
- Wheel base 13 ft
- Truck width 11.5 ft
- Four wheel front axle Minimum
- Mast tilt 5°
- Side shift 1 ft
- Elevated, high visibility operator cab
- Open, high visibility mast
- High speed hoist / lowering

The RTGs recommended are capable of stacking containers up to five high (one over four) and, while it is possible to reach this density if the RTG is used to store empties, it is not practical for loaded containers. Since the RTG works from the top down, it is necessary to shift top containers to reach lower ones. The result is a decline in productivity as the average stack height increases. As productivity declines, additional RTGs and labor must be added to achieve the same throughput. An average stack height of three high, for loaded containers, has been assumed in determining equipment needs. While it is possible to exceed this number to accommodate short term cargo peaks, it is not recommended over the longer term.

Active reefers (refrigerated containers) will also be stacked using the RTGs. Access platforms, with wide stairways, should be positioned between each stack of reefers. The platform, located next to the refrigeration unit, will provide access to "plug in" the reefer and also perform necessary monitoring and minor maintenance or adjustment. This concept of higher density reefer storage, has been used successfully in terminals throughout the world.

Equipment is currently available to stack empty containers seven high and even higher. However, the time required to accomplish this density is considered to be excessive, and a stack height for empties of four high is recommended for Veracruz. The empty handler recommended above is capable of stacking containers five high, which may be necessary during higher volume, seasonal peak periods. It is recommended that additional off-site storage for empties be used, if stack height exceeds four high for an extended length of time.

5. ***Movement of Cargo Out of Storage***
Cargo moving out of storage, to be loaded onto the train, as well as export cargo to be loaded aboard ship, will move via the yard tractor and yard chassis, as discussed in point number three above. Containers being moved to the gate will be loaded onto the trucker's chassis. This system provides for a routine operation, since all container movements within the terminal will be by chassis.

6. ***Gate Capacity***
Traditionally, the capacity of the terminal gate must accommodate a level of activity equal to twice the berth throughput. This due to the fact that the traditional import load moves out of the terminal, through the gate, to be delivered to the consignee and then back into the terminal as an empty, where it is cleaned and prepared for delivery to the export shipper. It moves through the gate a second time when it is delivered to the export shipper for cargo loading.

However, for the Port of Veracruz, it is necessary to consider the impact of the number of empty containers that move through the Port, as well as the volume that will move into and out of the terminal by rail. These factors will effectively reduce the number of containers that move through the gate.

5.2.5 Computer Model

An MS Excel multi-layered spreadsheet-based model was developed for Veracruz. The model is driven by the forecast volume, and defines the number of berths, equipment, storage area, gate lanes, etc, required to adequately accommodate the forecast volumes. Existing equipment and facilities for both

CICE and ICAVE have been incorporated into the model for the period prior to their relocation. Based on the volumes forecast in each of the scenarios, it is considered in the model that the existing CICE and ICAVE operations would be shifted to newly constructed facilities, and existing equipment relocated in future years, as discussed further below.

The CICE terminal lease will expire on January 1st 2018 and the ICAVE terminal lease will expire on July 28, 2015. While it may be that these terminal operators will be successful in extending their concessions, a conservative approach has been taken for the purpose of the financial analysis, assuming that a new operator will be selected. As a result of this assumption, the cost of new equipment will be incorporated into the cost model.

The assumptions used in preparing the model have been listed at the end of this section.

Three cargo scenarios were considered. The terminal and equipment requirements for each of these scenarios have been listed in table form below.

Existing equipment and facilities, currently being used in the CICE and ICAVE terminals have been listed below. It has been assumed that this equipment will not be relocated to the new terminal area to support the operations, but this equipment has not been included in the tabulation of "New / Additional Equipment" summarized for each of the cargo scenarios. The tables labeled "new" equipment do not include the existing equipment, even though the existing equipment currently being used by CICE and ICAVE will be relocated to the new terminals.

Existing Berth & Equipment	
Berth	2
Storage capacity	25,164 TEUs
Container cranes	5
RTGs	18
Tractors & Chassis	40
Empty handlers	6

Relocation of the CICE and ICAVE operations to the new port facilities is recommended to be completed in the year listed in the table below. Once the relocation has been completed, the existing container berth and terminal space will be available to handle other cargo. In other words, for the Base Case scenario, CICE's container operations will be shifted to the new terminal area in 2015 and ICAVE's equipment and container operations will be shifted to the new terminal area in 2020. For the Probable Case scenario, CICE will shift in 2010 and ICAVE will shift in 2015. For the Optimistic Case, both operators will shift to the new terminal area by 2010.

Timing of CICE and ICAVE Relocation to New Terminal

	Forecast Scenario		
Operator	***Base***	***Probable***	***Optimistic***
CICE	2015	2010	2010
ICAVE	2015	2015	2010

Base Case	**New / Additional Equipment**				
Equipment Type	2010	2015	2020	2025	Total
Berth		3		1	4
Cranes		7			7
RTGs		19		3	22
Empty Handler		6		2	8
Yard Tractors	2	53	2	2	59
Chassis	7	53	7	2	69

Probable Case	**New / Additional Equipment**				
Equipment Type	2010	2015	2020	2025	Total
Berth	1	2		1	4
Cranes	3	5		4	11
RTGs	7		5	7	31
Empty Handler	6		2	3	11
Yard Tractors	25	22	6	34	87
Chassis	34	26	8	27	95

Container storage capacity for the probable case will become strained in 2020, through the end of the study. While the number of terminals defined will provide for the average storage demand, the peak demand can not be contained within the number of terminals required to meet the other needs. This problem can be overcome by incorporating an off-dock storage area of approximately 15 to 20 hectares or by shortening the dwell time for imports and exports by one day.

As container volumes grow the operational advantages provided may suggest that an off-dock container yard (CY) is the best solution to this shortfall. However, it is considered that it is also reasonable to expect the dwell time to shorten, in line with the improved service levels offered by the increased number of vessel calls.

Optimistic Case	**New / Additional Equipment**				
Equipment Type	2010	2015	2020	2025	Total
Berth	3	1	1	2	7
Cranes	7	2	2	5	16
RTGs	20	7	12	18	57
Empty Handler	6	2	5	7	20
Yard Tractors	57	16	18	39	130
Chassis	60	16	23	39	138

Storage capacity for the Optimistic Case in 2020 and beyond, like the probable case, will fall short of meeting the peak demand. Shortening the dwell time for both imports and exports by two days each and increasing the stack height slightly to 3.25 (from 3 high) will overcome this constraint. Off-dock CY storage is another alternative, and it would be possible to set up a single yard or possible multiple yards totaling 40 to 45 hectares to support the peak demand capacity requirement.

As mentioned in the previous case, an off-dock CY may improve operating efficiency, suggesting it to be an effective option for a variety of reasons. However, it would be expected that there would be a natural shortening of the dwell time as service levels increase.

5.2.6 Support Facilities

Individual terminals should also include the following capabilities:

Offices, management and operations

Office space must be provided for general management as well as day-to-day operation of the terminal. To be located near the gate area of the terminal, the main office should be a three or four- story building of approximately 10,000 sq. ft. (900 m2)

Marine Building

The Marine Building should be located near the berth, in a location that will not restrict the traffic flow or hinder vessel operations. However, it is preferable that the location offer a vantage point for vessel operations. It is recommended that the Marine Building house the vessel, marine operations and stevedoring staff, as well as the crane maintenance staff, to ensure that they are responsive to the ongoing operation as well as the vessel stevedoring activity.

To provide these functions, the Marine Building should be a two-story building of approximately 40 feet (12 m) by 50 feet (15 m), with a total of 4,000 sq ft (360 m2). Crane maintenance and stevedoring would be on the first floor, with vessel and marine operations being on the second floor.

Maintenance, equipment and power

To ensure the reliability of the terminal operations, a suitable maintenance building must be provided to facilitate preventative maintenance and repair programs. Due to similarities in the skills required, it is recommended that maintenance of the RTGs be provided by the same team that provides crane maintenance and that these responsibilities be based in the Marine Building.

A separate maintenance facility should be established for the remaining power equipment, and located in the back of the terminal, away from the high traffic berth area. The maintenance facility should be a single-story building of approximately 2,500 sq ft. (225 m2).

Gate, multi-lane, covered gate and office

The gate will require a total of eight lanes. Each of the lanes will require a gate booth to be located on the

driver's side. The center two lanes shall be constructed so the traffic flow can be handled in either direction (reversing), to accommodate traffic peaks. The gate should be designed with a canopy that will adequately cover the entire length of the truck and chassis, and include a "load cell" truck scale for each lane.

RTG storage, runway system
A concrete runway system will be required to support the RTGs.

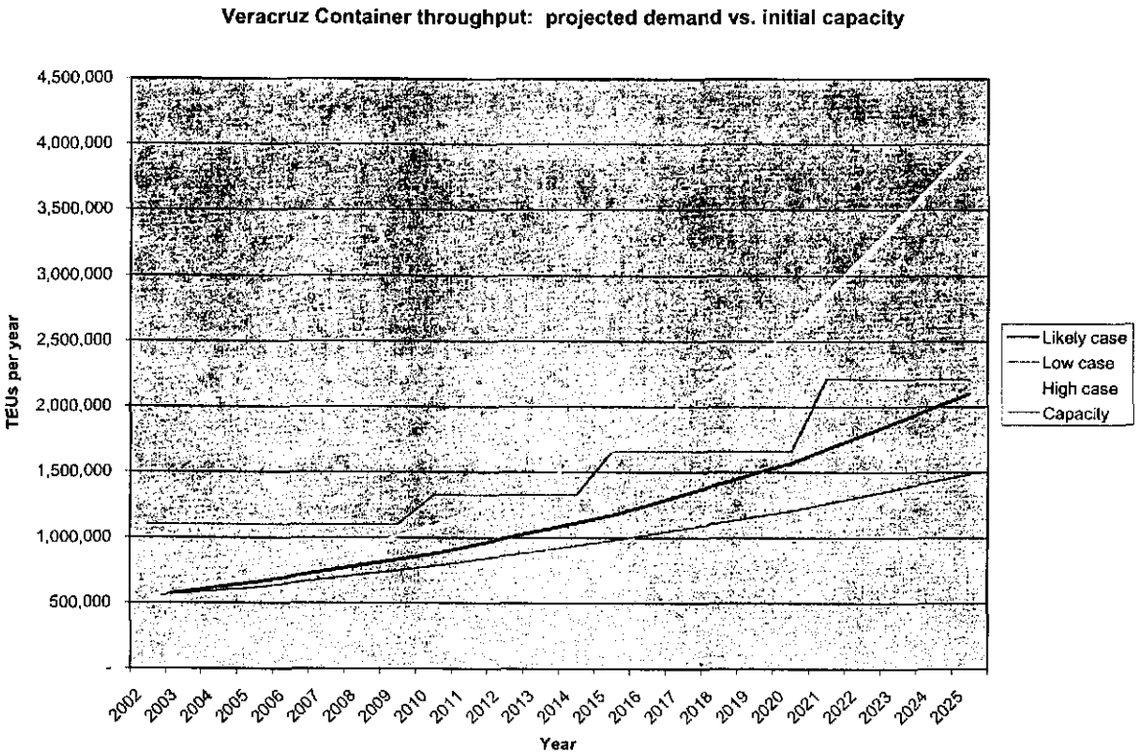
Reefer capabilities
Suitable electrical power and distribution as well as access platforms will be required.

Miscellaneous
Facilities will also be required to comply with local Customs regulations, provide security, yard lighting, terminal utilities and drainage.

5.2.7 Assumptions for Container Capacity

a. Container operations within the Port of Veracruz will be provided by a limited number of terminal operators, in order to ensure adequate economies of scale.
b. New terminals will be constructed and placed into service to ensure that berth occupancy does not exceed a level of 50 to 55%.
c. An average cargo dwell period of 10 days for import cargo and 9 days for export cargo was used in the analysis.
d. Individual terminals are assumed to have an average storage capacity of 13,200 TEUs, with an average stack height of three high.
e. Vessel calls have been divided into two categories: Feeder vessels of a size generally smaller than 30,000 DWT, and line haul vessels of a size greater than 30,000 DWT. On this basis, feeder vessels provide slightly more than half of the vessel calls but only 15% of the cargo. Line haul vessels carry 85% of the container cargo moving through the Port of Veracruz.
f. Vessels will arrive and depart the berth in a timely manner. Waiting time will be at the anchorage, not while on berth.
g. Multi-crane operations will be provided in an effort to "turn" the vessel faster and reduce berth occupancy.
h. A 25% peaking factor has been incorporated to ensure adequate capacity for weekly as well as seasonal peaking impacts.
i. Hourly production for multi-crane operations will be reduced slightly to reflect the normal impacts encountered. Crane production will be at 90% when two cranes are used. Production will be at 85% when three or more cranes are used.
j. An agreement between terminal operators will provide for the exchange of crane usage, during idle periods.
k. The current box ratio of 1.6 TEU / container has been increased over the term of the study to 1.7.
l. Single-crane average hourly production has been increased over the term of the study from an initial rate of 25 moves per hour to 37 moves per hour.
m. Rail volume has been assumed to be 20% of the overall throughput.
n. Empty containers have been assumed to be 20% of the overall throughput.
o. Refrigerated containers (reefers) will be grounded. An access platform will be provided for service and inspection.
p. Loaded containers will be grounded using Rubber Tired Gantry cranes (RTG) with an average stack height of 3 high.
q. Empty containers will generally be stored with equipment sized to handle empties.
r. RTGs will be used for rail loading.
s. Conventional yard tractors will be used for movement of loaded and empty containers.

5.2.8 Capacity vs. throughput demand



The figure illustrates the phased development of capacity to accommodate the forecast demand for the likely or probable case of demand forecast, providing for an increase of capacity to more than 2 million TEUs per year in 2025.

5.3 Grain Facility Requirements

5.3.1 Introduction

The existing grain capacity at the Port of Veracruz was reviewed and the necessary facilities and equipment were defined to meet the forecast growth in grain throughput. Section 4.3 briefly reviewed the capacity elements. The recommended improvements and associated capacities to accommodate forecasted demand have been described on a spreadsheet model, indicating the specific improvements and the capacities of the associated facilities to accommodate the forecasted grain handling demand, and to determine the facility and equipment requirements to efficiently handle the forecast grain volume for each of the cargo scenarios considered.

5.3.2 Existing facilities

Grain is currently handled at the Port of Veracruz by two terminal operators, Cargill and TCE. The Cargill facility operates using the Espigon Wharf. TCE operates using Berth 6S, where there are unloading hoppers and two conveyors, as well as Berths 4N and 4S, by truck. Vessels are unloaded pneumatically at Cargill to concrete silos. Vessels are worked using ships' gear at the various berths used by TCE, using either conveyors or trucks to bring grain to the silos, a short distance from the berths. The unloading using ships' gear and the use of trucks provides a number of operational challenges that increase cost, adversely impact security and generally contribute to lower overall productivity and greater berth times for ships when compared to modern terminals designed for efficient grain handling.

In addition to Cargill and TCE, TMV has proposed a project for a new grain terminal inside the existing port, at the site of the existing alumina wharf and also involving a portion of the Espigon Wharf. The project description was received following completion of the main analysis for this task. However, TMV was integrated into the analysis in an alternative scenario.

The purpose of the improvements described in this section is to improve the efficiency and cargo handling capacity of the existing grain terminals inside the Port, in order to accommodate forecasted demand. The focus is on the probable case of demand forecasts, but optimistic forecasts were also considered. The provision of unloading equipment, conveyors, additional storage and additional rail and truck loadouts are considered in order to achieve higher unloading rates at berths, control berth occupancy levels with increased throughput, increase handling capability from the berth to the storage, enhanced storage and loading of railcars and trucks. The aim is to increase the handling capability for grain inside the existing port, up to the point where the forecasted demand would require development of new berths at a new location. There may be contractual considerations that will affect the expansion of the existing facilities, such as storage, recommendations are included for each cargo scenario, based on operating efficiency and productive use of the Port's facilities. As grain throughput continues to grow, it will become increasingly important for the Port to utilize the Port's facilities with increasing efficiency to ensure the most productive return on their facilities, and that berth occupancies, congestion and operating costs are not unduly impacted by facility limitations.

5.3.3 Capacity Components

Each of six capacity components must be considered, including:

1. <u>Berth Capacity</u>
   This element includes the capacity to berth cargo vessels and timely access from the outer marker and water depth. Consideration must also include adequate length of berth, congestion within the harbor, at turning basin and at the entrance channel.

2. <u>Vessel Unloading and Loading Capacity</u>
   This element includes the capacity to unload and load cargo vessels in a timely and reliable manner to insure that the vessel's schedule is maintained. Additional shore based equipment can be provided to increase unloading rates and efficiency.

3. <u>Capacity to move the bulk material from the berth to the storage area</u>

Many of the existing berths rely on shuttle trucks to move bulk material into or from the storage area but, for higher throughput and longer distances, belt conveyors are utilized.

4. Bulk Material Storage Capacity
   The overall storage capacity, in conjunction with the length of time the average consignment remains in the terminal (dwell time) will directly affect the terminals throughput capacity.

5. Movement of Cargo out of Storage
   Bulk material has to be reclaimed from the storage silos and flat buildings with reclaiming feeders of adequate capacity. In the case of imported material, reclaimed bulk material has to be loaded into trucks and railcars with adequate truck loading and rail car loading facilities. In the case of exported material, reclaimed bulk material has to be transferred to the berths via shuttle trucks or via belt conveyors, similar to component three.
6. Gate Capacity
   Traditionally, the capacity of the terminal gate must accommodate a level of activity equal to twice the berth throughput. This is due to the fact that the traditional import load moves out of the terminal by train or truck, through the gate, to be delivered to the consignee and then back into the terminal as an empty train or truck, where it is cleaned and prepared to receive the next loading.

5.3.4 New facilities

Section 6 includes evaluation of the various port locations being considered for development and provide recommendations. In this section, it is assumed that the new grain facilities will incorporate the necessary attributes of location, adjacency and size to provide efficient operation over the long term.

The analysis is based on an MS Excel spreadsheet, which was used to produce the tables included in Appendix B, providing details of each step of the recommended improvements of facilities and equipment, and relating these improvements and the resulting capacity to the throughput demand.

This document contains the following Tables:

Table B-1a	Summary of Grain Handling Improvements, Throughput Capacity and Demand Forecasts – Base Case Alternative A
Table B-1b	Summary of Grain Handling Improvements, Throughput Capacity and Demand Forecasts – Base Case + TMV Alternative A
Table B-1c	Summary of Grain Handling Improvements, Throughput Capacity and Demand Forecasts – Base Case Alternative B
Table B-1d	Summary of Grain Handling Improvements, Throughput Capacity and Demand Forecasts – Base Case + TMV Alternative B
Table B-2	Grain Unloading – Actual Operations 2002
Table B-3	Grain Unloading Throughput – Projected for 65% Occupancy
Table B-4	Grain Unloading Throughput – Intermediate Step Future Expansion
Table B-5	Grain Unloading Throughput – First Step Future Expansion
Table B-6	Grain Unloading Throughput – Second Step Future Expansion
Table B-7	Grain Unloading Throughput – Third Step Future Expansion

Table B-8	Grain Unloading Throughput – Fourth Step Future Expansion
Table B-9	Grain Unloading Throughput – Fifth Step Future Expansion
Figure B-10	Berth – Waiting Time Factors Tw/Tb at % Berth Occupancy
Table B-11	Description of Chart - Figure No. B-10
Chart B-12a	Grain Forecast and Steps of Future Expansion Base Case – Alternative A
Chart B-12b	Grain Forecast and Steps of Future Expansion Base Case + TMV – Alternative A
Chart B-12c	Grain Forecast and Steps of Future Expansion Base Case – Alternative B
Chart B-12d	Grain Forecast and Steps of Future Expansion Base Case + TMV – Alternative B

The Summary Tables B-1a to B-1d list the Grain Handling Improvements and resulting throughput capacities, compared to the Forecast of Grain Imports to 2025 from Section 3. Referring to the table, the probable forecast in 2025 is 18.1 million tons, while the Base Forecast is 10.4 million, and the optimistic forecast is 31.2 million tons in 2025. In 2002, the grain imports totaled 5.92 million tons, handled by the two existing grain terminals, Cargill and TCE. Two cases are considered: a base case starting from the existing facilities at the Port of Veracruz, and a base case + TMV, where a new 2 million ton per year terminal is developed as expected. Alternative A includes development in the fifth step of expansion of a single face berth with three pneumatic unloaders. Alternative B includes development in the fifth step of a two face jetty berth with a total of six mechanical unloaders.

Section 4 discusses operations in 2002, with imports of 5.92 million tons of grain and berth occupancies ranging from 72.1% to 84.5%; averaging 75.2%. Section 4 also analyzes present capabilities for the two existing terminals, Cargill de México (Cargill) and Terminales de Cargas Especializadas (TCE), concluding that at 65% occupancy Cargill will be able to handle 1.6 to 1.7 million tons, while TCE will be able to handle 4.5 to 4.6 million tons, resulting in a total 6.1 to 6.3 million tons at 65% berth occupancy. These scenarios have been tabulated on Tables B-2 and B-3. Since the annual waiting time for all 218 vessels in 2002 was reported as 8,416 hours or 350.6 days total this results in "Tw" = 1.61 days per vessel. Berthing time "Tb" in 2002 was 6.47 days per vessel. From these a value Tw/Tb = 0.248 was calculated at an average berth occupancy of 75.2%. This value has been used as a base to prorate and forecast waiting times for future scenarios. These are based on statistical equations (see Table B-2, Figure B-10 and Table B-11).

For the projected throughput of 6.1 to 6.3 million tons at 64% to 66% occupancy, the waiting time per vessel will be reduced to a range of 0.85 to 0.93 days per vessel (see Table B-3). Improvements would be required to reduce the ship time at berth and berth occupancy to these levels.

Storage at this point is not a bottleneck. Based on storage capacity, at 7 days dwell time, Cargill, with 50,000 t storage capacity will be able to handle up to 2.6 million tons and TCE, with 96,000 t storage capacity, will be able to handle 5 million tons. The total for both terminals is 7.6 million tons.

CARGILL TERMINAL:

Intermediate Step and First Step to Fifth Step Expansion for Cargill Terminal:

(See Tables B-3, B-4, B-5, B-6, B-7, B-8 and B-9)

Recommended improvements:

- Install 500 t/h mechanical unloader;
- Add new conveyor or upgrade present conveyor to 1,200 t/h;
- Add 10,000 tons storage; and
- Increase rail and truck loading facilities.

The 200m long Cargill Jetty reportedly has 11m water depth and can receive Panamax vessels up to 225m LOA. It is not known if it is possible to dredge any further at that jetty, to accommodate fully loaded (FL) vessels (12.8 m FL draught), although use of fully laden Panamax vessels would provide more economical and competitive shipping. It is recommended to purchase one 500 t/h mechanical continuous unloader to increase the unloading capacity of the two existing t/h pneumatic unloaders.

A suitable type of unloader would be a continuous type such as a chain type unloader. This type of unloader requires substantially less energy compared to the pneumatic type and also may handle the product more carefully than a pneumatic unloader. This new unloader would travel on the same front rail and may require a new back rail, if the present rail gauge is too narrow. The new unloader could discharge to a new conveyor system, parallel to the existing conveyor system; however, if there is no room, the present conveyor system has to be upgraded from 600 to 1200 t/h. The present system, with two 500 t/h pneumatic unloaders yields an average rate of 298 t/h and at 65% berth occupancy (5,460 hours or 243 days at 22.5 hours per day) can handle 1,627,000 tons per year.

After installing the additional 500 t/h unloader, the system will be capable to handle 2.8 to 3.0 million tons per year at the berth within 5,202 to 5,566 hours at an average rate of 12,918 to 12,935 tons per day. The berth occupancy will range from 62% to 66% (see Tables B-5, B-6, B-7, B-8 and B-9).

This throughput requires 10,000 tons additional storage, bringing the total capacity from 50,000 tons to 60,000 tons. At 7 days dwell time the storage throughput results in 60,000 tons x 52.14 7-day periods per year = 3.13 million tons annually.

New or increased loading facilities for railroad and trucks have to be provided as well.

These elements complete the improvement of the Cargill jetty, equipment, storage and supporting facilities. The resulting system will be able to handle 2.8 to 3.0 million tons per year.

TCE TERMINAL:

Intermediate Step of Expansion: (Table No. B-4)

Recommended improvements:

- Install four 250 t/h traveling hoppers on Berth 5N; and
- Install 1,800 t/h belt conveyor on Berth 5N.

As an Intermediate Step it is proposed to transform Berth No. 5N by installing four traveling hoppers of 250 t/h each at the berth, feeding a new belt conveyor at that berth and transfer the unloaded material to the existing TCE storage silos. The conveyor system should be designed for 1,600 t/h, suitable for the First Step Expansion, when three 600 t/h unloaders will be installed. This new traveling hopper system would increase the capacity of Berth No. 5N, at present ranging from 1.35 to 1.38 million tons per year to a range of 1.80 to 1.84 million tons per year, the same as has been projected for Berth No.6S. Operations at Berth No.4S handling 1.35 to 1.38 tons have to be moved to berth No. 5S, the TCE total capacity will increase from between 4.5 and 4.6 million to between 4.95 and 5.06 million tons per year.

Total throughput capacity for Cargill and TCE after this Intermediate Step Expansion will be 2.80+4.95 = 7.75 million tons low and 3.00+5.06 = 8.06 million tons high. There will be capacity to serve 274 to 282 vessels annually. Average berth transfer rate will be 6,938 to 6,999 tons per day and average berth time

per vessel will be 4.08 days. Overall berth occupancy for the berths will range from 64% to 66% and the average waiting time is calculated to 0.54 to 0.59 days per vessel.

Improvements for Case with TMV:

- Installation of two 500- t/h unloaders at TMV;
- Installation of 1,200 t/h conveyor system at TMV; and
- Installation of railcar and truck load out system at TMV.

In the case with development of a third grain facility inside the existing port at TMV, the new Berth 5N are not required in the intermediate step to meet forecasted demand for the probable case. With TMV providing 2 millions tons per year of capacity, the port would have a capacity of 8.1 to 8.3 million tons.

First Step Expansion: (Table B-5)

Recommended improvements:

- Install three 600 t/h traveling mechanical unloaders on new Berth 5N;
- Increase storage capacity by 44,000 tons; and
- Provide new rail car and truck loading facilities.

Three traveling mechanical unloaders with a design capacity of 600 t/h each shall be provided at Berth No. 5N, feeding the 1,800 t/h conveyor system that was installed in the Intermediate Step. This system will be capable to handle 3.6 to 3.9 million tons per year at a berth transfer rate of about 17,000 tons per day within 212 to 229 days. The berth occupancy will range between 60% and 65%.

Operations at Berth No.4S had been shifted to new berth No. 5S in the previous intermediate step. This operation at new Berth 5S will continue. The dual Berth No. 5S will handle 1.35 to 1.38 million tons (as determined in Section 4. In addition, another 1.80 to 1.84 million tons will be handled at Berth No.6S (as determined in Section 4. The berth occupancy will range from 64% to 66% both for Berths 5S and 6S. Thus the total TCE capacity will range from 6.75 to 7.12 million tons.

With a minimum of 7 days dwell time, the TCE storage capacity has to be increased from present 96,000 tons by 44,000 tons to 140,000 tons, increasing the capacity limit at 7 days dwell time to about 7.3 million tons.

New rail car and truck loading facilities have to be provided.

Total throughput for Cargill and TCE after the First Step Expansion will be 2.80+6.75 = 9.55 million tons low and 3.00+7.12 = 10.12 million tons high. There will be 337 to 351 vessels annually. Average berth transfer rate will be 8,648 to 8,796 tons per day and average berth time per vessel will be 3.28 days. Overall berth occupancy for the berths will range from 63% to 66% and the average waiting time is calculated to 0.42 to 0.48 days per vessel.

Improvements for the case with TMV:

- Mobile hoppers and conveyors for Berth 5N; and
- Mobile hoppers and conveyors for Berth 5S.

In the case with TMV, the additional unloaders at Berth 5N would not be required to meet the probable case of the demand forecasts. The Port would have a capacity of 10.2 to 10.5 million tons per year.

Second Step Expansion: (Table B-6)

Recommended improvements:

- Install three 600 t/h traveling mechanical unloaders on Berth 5S;
- Increase storage capacity by 45,000 tons; and
- Provide additional rail car and truck loading facilities.

Three traveling mechanical unloaders with a design capacity of 500 t/h each shall be provided at Berth No.5S. These will be capable to handle 3.6 to 3.9 million tons per year at a berth transfer rate of about 17,000 tons per day within 212 to 229 days. The berth occupancy will range between 60% and 65%.

Berth 5N will handle another 3.6 to 3.9 million tons (as determined in the first step). In addition another 1.80 to 1.84 million tons will be handled at Berth No.6S (see above). Thus the total TCE capacity will be 9.00 to 9.64 million tons.

With a minimum of 7 days dwell time, the TCE storage capacity has to be increased from 140,000 tons (First Step) by 45,000 tons to 185,000 tons, increasing the capacity limit at 7 days dwell time to about 9.65 million tons.

Additional rail car and truck loading facilities will also be required at this stage.

Total throughput for Cargill and TCE after the Second Step Expansion will be 2.80+9.00 = 11.80 million tons low and 3.00+9.64 = 12.64 million tons high. There will be 417 to 438 vessels annually. Average berth transfer rate will be 13,617 to 13,746 tons per day and average berth time per vessel will be 2.08 to 2.10 days. Overall berth occupancy for the 4 berths will range from 62% to 66% and the average waiting time is calculated to be 0.26 to 0.30 days per vessel.

Improvements for the case with TMV:

- Install three 500 t/h traveling mechanical unloaders on new Berth 5N;
- Increase storage capacity; and
- Provide new rail car and truck loading facilities.

In the case with TMV, the improvements to Berth 5N, which without TMV would have been required in the first step, are now included in the second step. With these improvements and TMV, the Port would have a capacity for 12.0 to 12.6 million tons per year, sufficient to accommodate the probable case demand.

Third Step Expansion: (Table B-7)

Recommended improvements:

- Install two additional 600 t/h mechanical unloaders at Berth 5S;
- Increase storage capacity by 35,000 tons; and
- Provide additional rail car and truck loading facilities.

Another two mechanical unloaders with a design capacity of 600 t/h each shall be provided at Berth No.5S. This will bring the total throughput at Berth No.5S to 5.25 million tons low to 5.65 million tons high.

In this Third Step Berth No.5N will still handle 3.6 to 3.9 million and another 1.80 to 1.84 million will be handled at Berth No.6S (as determined in second step). Thus the total TCE capacity will be 10.65 to 11.39 million tons.

With a minimum of 7 days dwell time, the TCE storage capacity has to be increased from 185,000 tons (second step) by another 35,000 tons to result in 220,000 tons. This will increase the capacity limit at 7 days dwell time to about 11.47 million tons.

Additional rail car and truck loading facilities will also be required at that stage.

Total throughput for Cargill and TCE after the Third Step Expansion will be 2.80+10.65 = 13.45 million tons low and 3.00+11.39 = 14.39 million tons high. There will be 475 to 497 vessels annually. Average berth transfer rate will be 15,483 to 15,647 tons per day and average berth time per vessel will be 1.83 to 1.85 days. Overall berth occupancy for the 4 berths will range from 62% to 66% and the average waiting time is calculated to 0.23 to 0.27 days per vessel.

Improvements for the case with TMV:

- Install three 600 t/h traveling mechanical unloaders on Berth 5S;
- Increase storage capacity; and
- Provide additional rail car and truck loading facilities.

For the case with TMV, the improvements to Berth 5S which would have been done in the second step without TMV, would need to be carried out in the third step. With TMV and the third step improvements, the Port would have a capacity of 13.8 to 14.6 million tons per year.

Fourth Step Expansion: (Table B-8)

Recommended improvements:

- Install three 500 t/h traveling unloaders at Berth No. 6S;
- Increase storage capacity by 35,000 tons; and
- Provide additional rail car and truck loading facilities.

For the TCE Terminal it is proposed to develop Berth No.6S and provide three traveling unloaders of 500 t/h each. Thus Berth No.6S annual throughput will be increased from 1.80 to 1.84 in the third step to a range between 3.6 and 3.9 million tons. This will bring the annual throughput of the TCE Terminal to handle between 12.45 and 13.45 million tons in this fourth step.

With a minimum of 7 days dwell time, the TCE storage capacity has to be increased from 220,000 tons (Third Step) by another 35,000 tons to result in 255,000 tons. This will increase the capacity limit at 7 days dwell time to about 13.56 million tons.

Additional rail car and truck loading facilities will also be required at that stage.

Total throughput for Cargill and TCE after the Fourth Step Expansion will be 2.80+12.45 = 15.25 million tons low and 3.00+13.45 = 16.45 million tons high. There will be 538 to 566 vessels annually. Average berth transfer rate will be 17,815 to 17,909 tons per day and average berth time per vessel will be 1.59 to 1.62 days. Overall berth occupancy for the 4 berths will range from 61% to 66% and the average waiting time is calculated to be 0.19 to 0.23 days per vessel.

Improvements for the case with TMV:

- Install two additional 600 t/h mechanical unloaders at Berth 5S;
- Install three 500 t/h traveling unloaders at new Berth No. 6S;
- Increase storage capacity; and
- Provide additional rail car and truck loading facilities.

For the fourth step in the case with TMV, Berth 5S would be provided with two additional unloaders, as would have been done in the third step without TMV, and the three additional unloaders would still be installed. Together with these improvements and TMV, the Port would have a capacity of 17.3 to 18.5 million tons.

Summarizing the main features of the alternative with TMV for the various steps to step four

- Only the TMV Berth is added at the intermediate step.
- At the first step Cargill adds 500t/h unloader and 5N and 5S add mobile hoppers with conveyors and storage.
- At the second step three unloaders are added at 5N.
- At the third step three unloaders are added at 5S.
- At the fourth step three unloaders are added at 6S and two unloaders at 5S.

This brings the total throughput to 17.85 million, close to what is projected for the probable forecast in 2025.

Fifth Step Expansion – Initial Concept

The initial concept for fifth step expansion (see Table B-9) envisions two jetties, each with two faces, with three 500 ton per hour mechanical unloaders on each face of each jetty. Subsequent development of an Alternative A, reflects a more modest development of grain unloading capacity to meet demand forecasts. Alternative A envisions a single face berth with three 600 ton per hour pneumatic unloaders. Alternative B envisions a two face jetty with three 500 ton per hour mechanical unloaders serving each face, for a total of six such unloaders. Both of these subsequent alternatives can be expanded as demand warrants, for instance by constructing an additional Berth in Alternative A with three more pneumatic unloaders, or by constructing a second jetty in Alternative B, with an additional two faces, and six more mechanical unloaders, coupled with additional storage, rail and truck loading facilities and conveyors. Also, capacity can be enhanced using higher rated handling equipment, for instance Alternative A could be equipped with three 1,000 ton per hour pneumatic unloaders instead of 600 ton per hour units, if demand requires it, at a higher cost.

Fifth Step Expansion – Alternative A (See Appendix D)

The scope of this alternative covers the design, supply and construction of a multi grain trans-shipment terminal with one berth face. The new grain terminal contemplated in Alternative A provides approximately two thirds the capacity of the Alternative B facility. Depending on future demand requirements, the smaller facility envisioned in Alternative A can be developed in addition to or instead of Alternative B. The facility in Alternative B, with one Panamax jetty with two faces can also be developed, and subsequently doubled up to provide additional capacity when needed. The Alternative A facility includes pneumatic unloaders, but it should be noted that mechanical unloaders are an alternative which can be considered by the facility developer according to their requirements and demand criteria.

Proposed facilities:

- Construct one Panamax mooring;
- Install three 600 t/h pneumatic unloaders;
- Storage capacity of 112,000 tons;
- Truck and rail loading facilities.

The following criteria were used:

1. Yearly throughput - 5,200,000 metric tons.

2. Grain will be received in ships; the maximum size will be a Panamax vessel.

3. The grain will be stored by in concrete silos. The approximate storage capacity will be 112,000 metric tons.

4. The dock occupancy will be approximately 60%.

5. An average receiving rate of 1,080 MTPH should be striven for.

6. Grain will be distributed via trucks and railroad. The percentage handled by each system has not been determined.

7. Grain will weigh between 0.56 and 1.00 M.T./m3. For this study an average weight of 0.65 M.T./m3 was assumed.

Grain will be unloaded from ships by three pneumatic ship unloaders at the maximum rate of 600 MTPH each. The shiploader will deposit the grain onto a dock conveyor which in turn will feed an elevating conveyor which will bring the grain to the top of six concrete silos. A cross-conveyor will feed two shuttle conveyors which in turn will centrally feed three silos each.

The silos will have a total storage capacity of approximately 112,000 M.T. at a unit grain weight of 0.65 M.T./m3. The silos will be approximately 28.0 meters in diameter and 58.0 meters high. The silos will have flat bottoms. Clean-up will be accomplished with rotating screws or augers. The discharge will be in the center of each silo.

A conveyor will be placed under each set of three silos. These reclaim conveyors will each feed one of two conveyors which will feed either the truck or the railroad loading bins.

The truck loading system was designed to load trucks at 600 MTPH or 150 tons from each of four bins. The railroad loading was designed to load two sets of railroad trains at a combined rate of 1100 MTPH or 137.5 M.T. from each of eight bins.

The total storage capacity in the truck loading bins is 400 M.T.

The total storage capacity in the railroad loading bins is 800 M.T.

Fifth Step Expansion – Alternative B: (See Table B-9)

Proposed improvements:

- Construct a new 300 m jetty at a new location;
- Install three 500 t/h traveling unloaders on each face of jetty;
- Provide 150,000 tons storage capacity; and
- Provide new rail car and truck loading facilities.

In this alternative it is contemplated to build a new jetty of ~300m length at a new location. Each face of the new jetty shall be equipped with three 500 t/h traveling unloaders. A jetty must be ~ 40m wide to allow operation of unloaders on both faces. On each face of a jetty the throughput will range from 3.6 million to 3.9 million tons or a total of 7.2 to 7.8 million tons for each jetty.

Each such jetty will add 7.2 to 7.8 million tons to the throughput determined in the Fourth Step. There will be 128 to 135 vessels annually. Average berth transfer rate will be about 17,000 tons per day and average berth time per vessel will be 1.66 to 1.70 days at either location. Overall berth occupancy for the 2 new berth faces will range from 61% to 66% and the average waiting time is calculated to be 0.19 to 0.24 days per vessel at the new location.

With a minimum of 7 days dwell time, new storage capacity of about 150,000 tons has to be provided at the new location.

New rail car and truck loading facilities will also be required at the new location.
The table below summarizes the recommended improvements to 2025 for Alternative B with TMV expansion:

Berth / Year required to meet probable case demand	**2009**	**2013**	**2017**	**2020**	**2025**
TERMINAL	**Intermediate step additions**	**First step additions**	**Second step additions**	**Third step additions**	**Fourth step additions**
CARGILL ~200m E-Jetty	As existing at 65% occupancy	1 x 500 t/h unloader; RR and truck Load-out	No further additions	No further additions	No further additions
TMV Berth	2 x 500 t/h unloaders; RR and truck Load-out	No further additions	No further additions	No further additions	No further additions
TCE B#6S L~302m (to be reduced to 270m)	Same as Berth #6 in 2002 at 65% occupancy	No further additions	No further additions	No further additoins	3 x 500 t/h unloaders; RR and truck Load-out
TCE B#5N L~270m	Same as Berth #4N in 2002 at 65% occupancy	4 x 250 t/h mobile hoppers and conveyors	3 x 600 t/h unloaders; RR an truck Load-out	No further additions	No further additions
TCE B#5S L~270m	Same as Berth #4S in 2002	4 x 250 t/h mobile hoppers and conveyors	No further additions	3 x 600 t/h unloaders; RR and truck Load-out	2 x 600 t/h unloaders; RR and truck Load-out

CONCLUSION: (Charts B-5-1 and B-5-2)

Comparing the total figures of each step with the Forecast Figures, we can conclude that:

- The Intermediate Step Expansion with 7.75 to 8.06 million tons (average 7.905 million tons) throughput is suitable for the Probable Forecast until 2008.

- The First Step Expansion with 9.55 to 10.12 million tons (average 9.835 million tons) throughput *is suitable for the Probable Forecast until 2012.*

- The Second Step Expansion with 11.80 to 12.64 million tons (average 12.22 million tons) throughput is suitable for the Probable Forecast until 2017.

- The Third Step Expansion with 13.45 to 14.39 million tons throughput (average 13.92 million tons) throughput is suitable for the Probable Forecast until 2020.

- The Fourth Step Expansion with 15.45 to 16.45 million tons throughput (average 15.85 million tons) throughput is suitable for the Probable Forecast until 2022.

- The Port of Veracruz is contemplating the development of a new 2 million tons per year grain terminal, Terminales Marítimos de Veracruz (TMV) at the site of the existing alumina wharf. This facility would increase the total port-wide capacity envisioned in each of the steps by 2 million tons. This would mean that, with both the new TMV and the Intermediate and First to Fourth Step expansions, the port would have a capacity of approximately 17.85 million tons, making it suitable *for the Probable forecast until 2025 without a Fifth Step Expansion outside the present port.*

- The Fifth Step Expansion – Alternative A – a new berth with one face -- would provide about 5.2 million tons per year of additional capacity, while Alternative B – a new jetty with two faces -- would provide 7.2 to 7.8 million tons additional capacity. This additional capacity is not required for the Probable Forecast until after 2025.

As shown in Chart B-12b, with the recommended expansion steps one to four and TMV, the Port would have a capacity in 2025 of 17,850,000 tons per year, sufficient to accommodate the probable case for demand.

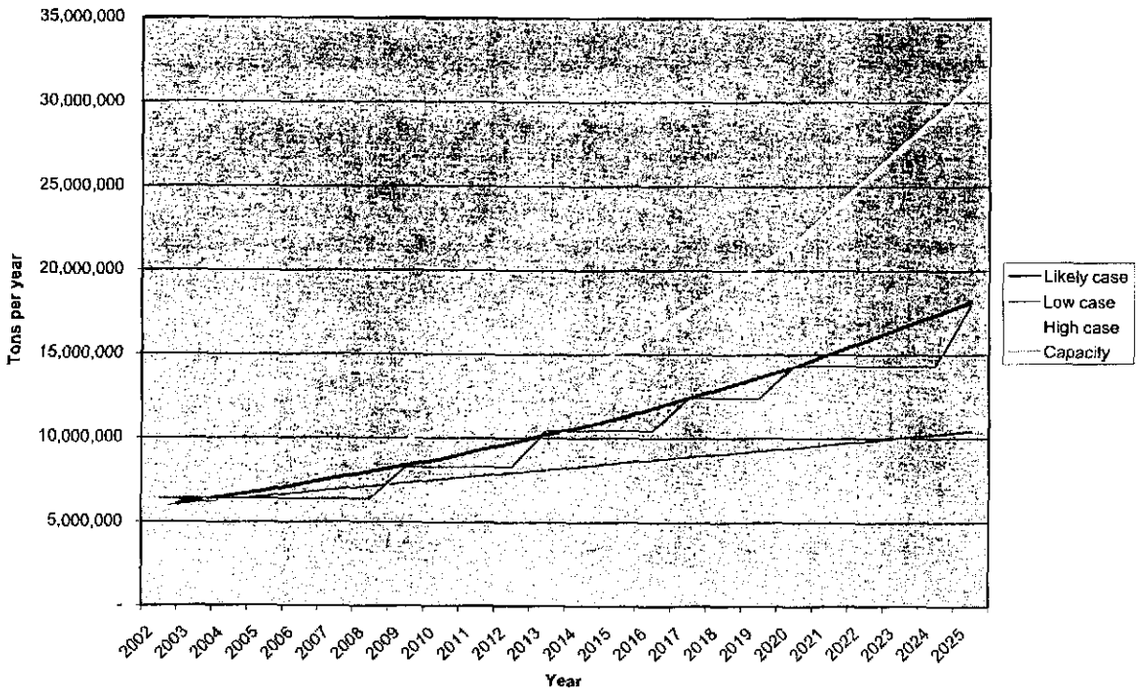
There are various other considerations, which may have an impact on the above conclusions:

- Berth No. 4, new Berth No. 5 and Berth No. 6 foundations and the design of the berths have to be examined carefully, before determining whether the present 9.0 to 10.0 m water depth can be dredged any further. To be on the conservative side, average cargo sizes of 2002 operations *have therefore been only modestly increased from the present 27,000 tons to a future 29,000* tons.

- The low storage dwell time of 7 days has a great impact on direct trans-loading of rail cars and trucks. It must be ensured that there is enough equipment (rail cars / trucks) available and enough marshalling space allocated to stage empty and loaded trains and trucks.

5.3.5 Capacity vs. Throughput Demand

Veracruz grains throughput: projected demand vs. initial capacity



Referring to the figure, the recommended development improvements provide for staged increases in throughput capacity to meet the probable case of demand forecasts of more than 17 million tons per year of bulk grains by 2025.

5.4 Automobile Terminals

5.4.1 Future Growth

The forecast for the next 20 years for auto units to be handled in the Port of Veracruz presented in Section 3 can be summarized as follows:

Base Forecast
(Vehicle units)

Exports					
Year	2005	2010	2015	2020	2025
Vehicle units	226,830	292,050	360,890	440,470	538,280

Imports					
Year	2005	2010	2015	2020	2025
Vehicle units	237,200	275,650	322,520	370,420	426,980

Probable Forecast
(Vehicle units)

Exports					
Year	2005	2010	2015	2020	2025
Vehicle units	228,830	295,050	368,050	474,200	610,960

Imports					
Year	2005	2010	2015	2020	2025
Vehicle units	253,040	293,890	341,340	396,450	460,460

Optimistic Forecast
(Vehicle units)

Exports					
Year	2005	2010	2015	2020	2025
Vehicle units	232,400	298,460	395,210	523,320	692,960

Imports					
Year	2005	2010	2015	2020	2025
Vehicle units	255,530	301,680	356,170	420,500	496,450

5.4.2 Required Facilities to Meet the Forecasted Growth

As was defined in the Section 4.4 of this Report, the Veracruz existing facilities have the following capacity:

Exported vehicles:

	2002	Capacity at Berth 1N
Car handling, the berth and ramp:	190,500 (occ. 22%)	326,000 (occ.37%)
Car storage, and dwell time in port:	7,000 cars, 7-day dwell	7,000 cars, 7-day dwell
uniform distribution over the year		364,000
varying distribution over the year	190,500	303,300
Car land transport handling facilities:	190,500	304,400

Imported vehicles:

Car handling, the berth and ramp:	2002 Capacity at Berth 7E 231,300 (occupancy 27%)	(40% by restricting other uses at 7E) 344,000 (occupancy 40%)
Car storage, and dwell time in port:	7,300 cars, 7-day dwell	7,300 cars, 7-day dwell
uniform distribution over the year		379,600
varying distribution over the year	231,300	316,300
Car land transport handling facilities:	231,300 316,300	

From the above tabulation of the critical capacity, it can be seen that due to some non-uniformly spaced delivery times and quantities of vehicles handled, the total yearly car storage volume is reduced.

The handling and utilization capacity of the Berth 1S is based on the exclusive use for handling autos, while Berth 7E is a multi-use wharf, which is also handling containers and miscellaneous cargo. Berth 1S occupancy could be increased further if ship arrivals are better scheduled, but the critical and controlling factor in the throughput of this berth is the storage limit in this area.

The south area of the port does not have parking lots for storage of autos. The Volkswagen parking garage has a limited capacity of 7,000 cars, when vehicles are parked back to back, with only limited drive aisles. The poor construction of number of decks requires continuous repairs, and arrivals of car carriers are, however scheduled, not of constant and uniform nature. Thus, in practice, the average yearly holding capacity of the garage does not exceed 5,800 vehicles. Without a second garage, the increase in throughput above 304,000 vehicles through Berth 1S is not feasible.

The only location, where additional garage could be built, is the area that could be filled by merging of Pier 1 with Pier 2. This scheme, would however, affect the overall number of berths in the port that is already running short of space.

The 304,000 vehicles capacity of the Berth 1S would be adequate up to year 2011 for the base forecast, or up to year 2010 and 7 months for probable forecast, or up to year 2010 for optimistic forecast.

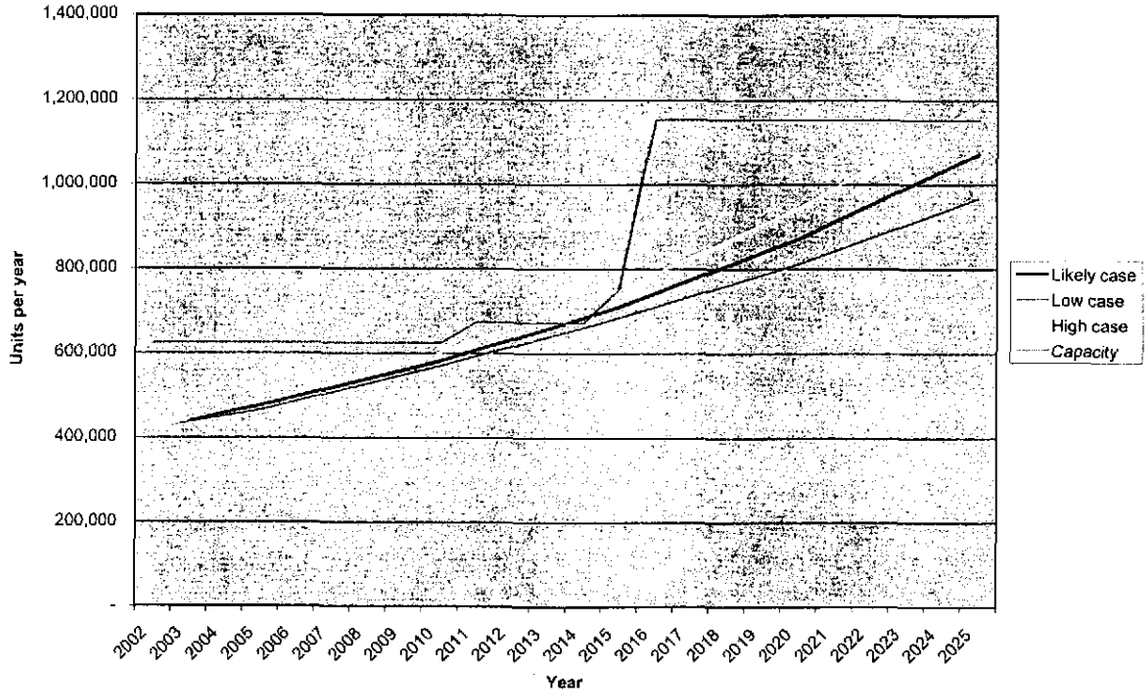
If the growth in the exports will exceed the capacity of the existing facilities, the facilities could accommodate the projected growth by reducing, on the temporary basis, the dwell time of vehicles from 7 days on average to 5.5 days and moving the vehicles the port and out around the clock. This would permit meeting the demand for space for up to 387,000 vehicles for export, which would satisfy the forecasted probable throughput of 368,050 vehicles in the year 2015. Although the reduction of the normal dwell time may require obtaining some other secure car holding lots outside the port, it could work as a temporary solution.

The imported vehicles are presently predominantly handled at Berth 7E. The berth is shared with CICE container and miscellaneous cargo. In such situation only 30% of berth occupancy could be dedicated to handling autos. Thus, to increase the share of the berth for autos to 40% would require some reduction on use of this berth by CICE, by shifting some of their container operations to Berth 7S and handling of miscellaneous cargo at other piers.

If the growth in the imports will exceed the parking capacity of the existing facilities, the facilities could accommodate the projected growth by reducing, on a temporary basis, the dwell time of vehicles from 7 days on average to 6.4 days and moving the vehicles to the port and out around the clock. This would permit meeting the demand for space for up to 345,000 vehicles imported, which would satisfy the probable forecasted throughput of 341,340 imported vehicles in a year 2015. As for exports, the reduction of the normal dwell time may require obtaining some other holding secure car lots outside the port as a temporary solution.

Beyond year 2015 additional or new facilities for berthing and parking would be required. If ICAVE or CICE, or both, obtain new terminal facilities outside the present port boundaries by the year 2015, or container handling is transferred out of these facilities, then the vacated terminals could provide excellent import facilities for auto imports, adequate for auto carriers for many years past 2025, without the cost of new construction.

Veracruz automobile throughput: projected demand vs. initial capacity



The chart illustrates the phased increments in capacity to meet the likely (probable) case of the throughput demand forecast for vehicles.

5.5 Non-petroleum Liquids Terminals

5.5.1 Projected Growth of the Veracruz Non-petroleum Liquid Cargo Throughput

There are two principal terminals in the Port of Veracruz which handle non-petroleum liquids. Vopak Terminal, operated by Vopak Terminals Mexico, S.A. de C.V., and Astro Terminal, operated by Grupo Industrial Astro, S.A. de C.V. are located at the north end of the port, adjacent to the Jetty Pier (espigon wharf).

Current Vopak terminal facilities in Veracruz include 88 tanks with a capacity of 118,000 m^3. Astro terminal facilities include 14 tanks with an overall capacity of 54,000 m^3.

The throughput of both terminals, considering export and import, in 2002 was 930,300 tons. Imports predominate with 90% of total volume.

The forecast of the projected future throughputs is as follows:

Forecast of Liquids Throughputs (tons):

Year	2005	2010	2015	2020	2025
- Base	1,030,000	1,247,530	1,472,280	1,687,720	1,929,420
- Probable	1,035,350	1,238,050	1,481,260	1,773,180	2,123,690
- Optimistic	1,047,500	1,277,300	1,558,570	1,902,990	2,324,900

5.5.2 Liquids Terminals Facilities to Accommodate the Forecasted Growth

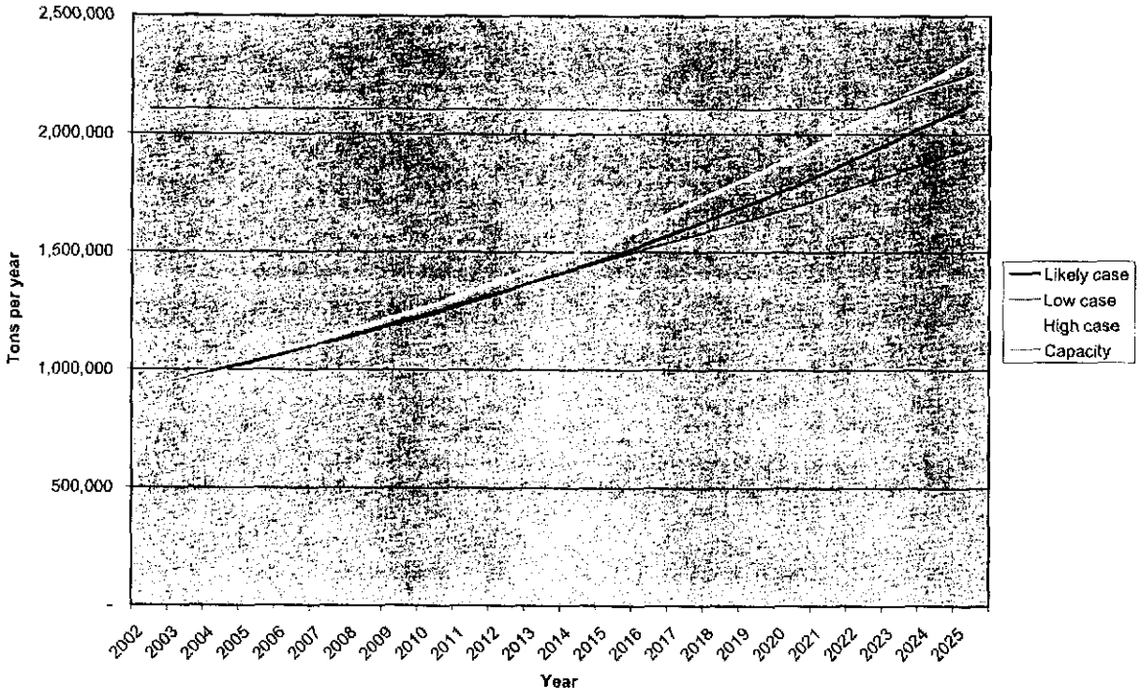
Berth occupancy:

The berth occupancy for Vopak handled products, based on 104 shipments at 15,000 tons and the yearly throughput 1,600,000 tons, is estimated to be 13%. The berth occupancy for Astro handled products, based on 100 shipments of 5,000 tons and the yearly throughput 500,000 tons, is estimated to be 8%. Thus, the combined estimated capacity of the berth facilities is 2,100,000 tons. This capacity could increase if somewhat larger tankers would dock at the pier. The present berth occupancy is small, but scheduling more than four arriving tankers to the berth per week is problematic and may result in excessive queuing. Larger ships would unload their cargo in somewhat longer times, but use of larger ships would result in less interference between the vessels.

Storage and local handling and shipping of the liquid cargo by rail and truck represent constraints, comparable to capacity to the berth operations. Thus the overall handling capacity of the terminal is 2,100,000 tons, with only minor adjustment of operations. That throughput capacity could further increase by organizing shipments in larger vessels and by reducing the extremely long dwell time (22 days in Vopak terminal and 45 to 60 days in Astro terminal). The dwell time to some degree could be regulated by a fee structure, once the storage is fully occupied.

The conclusion from the above assessment is that both Vopak and Astro terminals are adequate to satisfy the probable demand for shipped non-petroleum liquids up to year 2025.

Veracruz nonpetroleum fluids throughput: projected demand vs. initial capacity



5.6 Mineral Facility Requirements

5.6.1 Introduction

The analysis was prepared using an MS Excel workbook to prepare the tables contained in Appendix C. This document contains the following Tables:

Table C-1	Summary of Mineral Handling Improvements, Throughput Capacity and Demand Forecasts
Table C-2	Mineral Products Unloading - Actual Operations and Berths Utilized in 2002
Table C-3	Mineral Products Unloading – Actual Operations 2002
Table C-4	Mineral Products Unloading Throughput – Projected for 65% Occupancy
Table C-5	Mineral Products Unloading Throughput – First Step of Future Expansion
Table C-6	Mineral Products Unloading Throughput – Second Step of Future Expansion
Table C-7	Mineral Products Unloading Throughput – Third Step of Future Expansion
Table C-8	Mineral Products Unloading Throughput – Fourth Step of Future Expansion
Figure C-9	Berth – Waiting Time Factors Tw/Tb at % Berth Occupancy
Table C-10	Description of Chart - Figure No. C-9
Chart C-11	Minerals Forecast and Steps of Future Expansion

the following table lists the forecast of mineral products annual imports. In 2005, the base forecast is 2.8 million tons, Probable Forecast is 5.4 million tons and Optimistic Forecast is 9.2 million tons. In 2002, the actual mineral products imports were close to 1.8 million tons, unloaded at various berths by means of geared self-unloading vessels.

	Actual	**Forecast (tons)**				
Forecast Case / Year	**2002**	**2005**	**2010**	**2015**	**2020**	**2025**
Base	1,743,739	1,788,702	2,013,763	2,260,455	2,504,855	2,802,866
Probable	1,743,739	2,018,596	2,576,297	3,288,080	4,196,517	5,355,937
Optimistic	1,743,739	2,166,242	3,109,920	4,464,693	6,409,644	9,201,873

Based on the port operating data obtained from APIVER, the following mineral and other bulk products were imported in 2002:

Import commodity	2002 tons
Alumina	93,919
Iron Briquettes	127,083
Mineral Coal	10,650
Pig iron	178,922
Petroleum Coke	219,724
Silicomanganese	7,202
Miscellaneous	5,367
Subtotal Minerals	642,867
Scrap Metal	464,132
Fertilizer	715,656
Total	**1,822,655**

These products were unloaded at 11 different berths by means of 112 self-unloading vessels in 2002, as shown in the following Table:

Berth No.	2002 Berth Occupancy	Minerals+Scrap +Fertilizer		Weighted Combined Occupancy
		tons	percent	
1-N	35.2%	21,215	1.2%	0.4%
1-S	64.7%	54,644	3.0%	1.9%
2-N	55.5%	186,469	10.2%	5.7%
2-S	61.8%	198,323	10.9%	6.7%
4-NP	66.6%	200,800	11.0%	7.3%
4-NR	52.0%	102,237	5.6%	2.9%
6-E	65.9%	187,738	10.3%	6.8%
6-NP	13.0%	1,929	0.1%	0.0%
6-NR	69.6%	570,785	31.3%	21.8%
7-S	70.2%	271,515	14.9%	10.5%
7-E	54.1%	27,000	1.5%	0.8%
Total		**1,822,655**	**100.0%**	**64.9%**

The various berths, where mineral products were unloaded had to be shared with unloading operations of other products such as grain and general cargo. For details see Table C-2 in the Appendix.

Summarized operations regarding unloading of mineral products are shown in the following table:

#	Description	Year 2002	
1	**Total number of vessels [APIVER Report]**	112	-
2	**Total annual throughput of minerals [APIVER Report]**	1,822,655	Tons
3	Effective average semi-mechanized unloading rate [APIVER Report]	190	t/h
4	No. Vessels Waiting at anchorage [APIVER Report]	67	-
5	Time at anchorage [APIVER Report, rounded]	3,100	H
6	Initial waiting at berth [5.6% of #7] 2002	500	H
7	[Un]loading time in operation [#2 / #3]	9,600	H
8	Berth delays [29% of #7] 2002	2,800	H
9	Waiting to sail [7% of #7] 2002	700	H
10	Total Port time [#5+#6+#7+#8+#9]	16,700	H
11	Overall Berth Time [#6+#7+#8+#9]	13,600	H
12	Average Berth transfer rate #2/#11	134	t/h
13	Weighted average occupancy at 11 berths [350 days/year]	64.9	%
14	Average cargo per vessel [#2 / #1]	16,274	Tons
15	Average anchor time per vessel [#5 / #1]	27.7	H
15a	Average anchor time per waiting vessel [#5 / #4]	46.3	H
16	Average unloading time per vessel [#7 / #1]	85.7	H
17	Average berth time per vessel [#11 / #1]	121.4	H
18	Average port time per vessel [#10 / #1]	149.1	H
24	Average LOA of vessels	153	M
25	LOA range of vessels	106 - 200	M
26	Range of Vessels BRT	4,000 - 27,000	tons
27	Range of Vessels DWT	7,000 - 47,000	tons

Upon arrival, 67 out of 112 vessels had to wait at anchorage for over 46 hours due to berth occupancy, adverse weather and per user instruction. The other 45 vessels could enter a berth without waiting. On average all 112 vessels waited an average of 27.7 hours and then required an average of 121.4 hours to unload their cargo and leave the port. With an average of 16,274 tons of cargo per vessel, the average berth transfer rate was 16,274 / 121.4 = 134 tons per hour. The overall average port time per vessel was 27.7 + 121.4 = 149.1 hours. Vessel sizes ranged from 7,000 to 47,000 DWT having 106m to 200 m LOA (Length Over All).

In Section 4, it was established that 65% berth occupancy would be a reasonable approach to ensure moderate ship waiting at anchorage and economical cost per ton. Berth availability was established as 350 days per year. Therefore a total of 65% x 24 h x 350 d = 5,460 hours per year (227.5 days) was used as a base for 65% berth occupancy.

In 2002 it took 13,600 hours (566.7 days) to unload 1.823 million tons from 112 vessels at the various berths. To determine, how many dedicated berths of 65% occupancy would have been required in 2002, we can divide the 566.7 days by 227.5 days and obtain 2.5 berths. We can therefore say that 2.5 (two and one half) berths were required to handle 1.823 million tons and a single dedicated berth would have been capable to handle 1.823 million tons / 2.5 = approximately 730,000 tons annually at 65% occupancy.

We can also calculate this annual throughput for a single dedicated berth by using the 134 t/h berth transfer rate achieved in 2002 (item #12 of above table). A single berth at 65% occupancy could handle 134 t/h x 5460 h = approximately 730,000 tons per year and berth.

These scenarios have been tabulated on Tables C-3 and C-4. Since the annual waiting time for all 112 vessels in 2002 was reported as 3,100 hours or 129.2 days total, this results in "Tw" = 1.15 days per vessel. Berthing time "Tb" in 2002 was 13,600 hours / (24 x 112) = 5.06 days per vessel. From these factors, a value Tw/Tb = 1.15/5.06 = 0.228 was calculated. In Table C-2 the weighted average berth occupancy was determined as 64.9%. These values have been used as a base to prorate and forecast waiting times for future scenarios. They are based on statistical equations, as described in the Excel document (see Tables C-3, C-4 and C-10).

For the assumed two-and-one-half (2½) dedicated berths of approximately 65% occupancy, the projected throughput would range from 1,770,000 to 1,920,000 tons at 62% to 68% occupancy, and the waiting time per vessel will range from 0.99 days to 1.35 days per vessel (see Table C-4).

The existing storage capacity for mineral products is not known. Therefore, it is assumed that at 7 days dwell time and 52.1 cycles, at least 35,000 t storage capacity must exist, required as a base to handle the actual throughput of 1.823 million tons.

5.6.2 Facilities Requirements

First Step of Future Expansion: (Table C-5)

Proposed improvements:

- Dedicate two berth faces to minerals, e.g. Berths Nos. 4N and 4S;
- Operate Berth 4N for self-unloading vessels;
- Provide four 250 tph traveling hoppers on Berth 4S;
- Provide new 1,000 tph dock conveyor on Berth 4S; and
- Provide additional 15,000 tons of storage.

For the first step of future expansion, two dedicated berth faces are proposed to handle increased throughput. These two berths could be Berths No. 4N and 4S in the existing terminal or any other available berths in the existing terminal or berths located elsewhere.

It is assumed that Berth No.4N will be dedicated to, receiving self-unloading vessels and directly transferring the cargo to trucks at the berth at a rate of about 3,200 tons per day. This berth will handle 0.70 to 0.77 million tons per year at a berth occupancy ranging from 62% to 68% each. Average cargo sizes have been kept equivalent to 2002 operations.

Four traveling hoppers with a design capacity of 250 t/h each shall be provided at Berth No.4S feeding a new 1000 t/h dock conveyor, which transfers material to a new storage area. This system will be capable to handle 1.70 to 1.78 million tons per year at a berth transfer rate of about 7,600 tons per day within 223 to 233 days per year. The berth occupancy will range between 63% and 67%. Average cargo sizes also have been kept equivalent to 2002 operations.

Thus the total mineral products throughput capacity at Berths 4N and 4S will range from 2.40 to 2.55 million tons. There will be 144 to 149 vessels annually yielding 16,600 to 17,100 tons average cargo. The average berth transfer rate will be about 5,400 tons per day and average berth time per vessel will be 3.1 days. Overall berth occupancy for the two berths will range from 63% to 67% and the average waiting time is calculated to a range of 0.64 to 0.80 days per vessel.

A dock conveyor designed for 1000 t/h rate will be required to receive the product from the four traveling hoppers, which will transfer the products to the conveying system and on to the storage facility.

With a minimum of 7 days dwell time, the storage capacity has to be increased from the assumed existing

35,000 tons by 15,000 tons to 50,000 tons, increasing the capacity limit at 7 days dwell time to about 2.6 million tons.

New rail car and truck loading facilities have to be provided which must be linked to the storage reclaim system.

The annual tonnage of 2.40 to 2.55 million tons achieved with this system will be sufficient for the Probable Forecast up to the year 2009.

Second Step of Future Expansion: (Table C-6)

Proposed improvements:

- Install four 250 tph traveling hoppers on Berth No. 4N;
- Provide new 1,000 t/h dock conveyor on Berth No. 4N; and
- Provide 20,000 tons additional storage.

For the second step of future expansion, it is assumed that Berth No.4N will also be equipped with four traveling hoppers with a design capacity of 250 t/h each, same as installed at Berth No.4S in the First Step. These will be feeding a new 1000 t/h dock conveyor, which transfers material to the storage area. This system will be capable to handle 1.70 to 1.78 million tons per year at a berth transfer rate of about 7,600 tons per day within 223 to 233 days per year. The berth occupancy will range between 63% and 67%. Average cargo sizes have been kept equivalent to 2002 operations.

Thus the total mineral products throughput capacity will range from 3.40 to 3.56 million tons. There will be 202 to 208 vessels annually yielding 16,800 to 17,100 tons average cargo. The average berth transfer rate will be about 7,600 tons per day and average berth time per vessel will be 2.2 days. Overall berth occupancy for the two berths will range from 63% to 67% and the average waiting time is calculated to a range of 0.48 to 0.55 days per vessel.

A dock conveyor designed for 1000 t/h rate will be required to receive the product from the four traveling hoppers, which will transfer the products to the conveying system and on to a new storage facility.

With a minimum of 7 days dwell time, the storage capacity has to be increased from the previous 50,000 tons by 20,000 tons to 70,000 tons, increasing the capacity limit at 7 days dwell time to about 3.6 million tons.

New rail car and truck loading facilities have to be provided which must be linked to the storage reclaim system.

The annual tonnage of 2.40 to 2.55 million tons achieved with this system will be sufficient for the Probable Forecast up to the year 2016.

Third Step of Future Expansion: (Table C-7)

Proposed improvements:

- Install three 600 tph traveling clamshell unloaders at Berth No. 4N;
- Increase capacity of dock conveyor to 2,000 tph; and
- Provide 40,000 tons additional storage.

For the Third Step of future expansion, the same two dedicated berth faces as proposed for the First and Second Step of Future Expansion shall handle this throughput.

Three traveling clamshell unloaders with a "free digging" design capacity of 3 x 600 t/h shall be provided at Berth No.4N. These three unloaders will be capable to handle 3.8 to 4.0 million tons per year at a berth transfer rate of about 17,300 tons per day. The berth occupancy will range between 220 and 231 days or between 63% and 66%. Since Berth 4N can now also receive non-geared bulk vessels, the average

cargo size was increased from previous ~17,000 tons to about 28,000 tons.

It is assumed that the other dedicated berth will continue to operate with the four traveling hoppers installed in the First Step. These will handle 1.70 to 1.78 million tons throughput per year at a berth transfer rate of about 7,600 tons per day within 222 to 232 days per year at each berth. The berth occupancy will range from 63% to 67%. Average cargo sizes have been kept equivalent to 2002 operations at up to 17,000 tons.

Thus the total mineral products throughput capacity will range from 5.50 to 5.78 million tons. There will be 239 to 246 vessels annually yielding about 23,000 tons average cargo. Average berth transfer rate will be about 12,400 tons per day and average berth time per vessel will be about 1.85 days. Overall berth occupancy for the two berths will range from 63% to 66% and the average waiting time is calculated between 0.93 and 0.45 days per vessel.

The capacity of the dock conveyor and transfer to the storage has to be increased from previous 1,000 t/h to 2,000 t/h peak capacity.

With a minimum of 7 days dwell time, the storage capacity has to be increased from the previous 70,000 tons by 40,000 tons to 110,000 tons, increasing the capacity limit at 7 days dwell time to about 5.7 million tons.

Additional rail car and truck loading facilities have to be provided.

The annual tonnage of 5.50 to 5.78 million tons achieved with this system will be sufficient for the Probable Forecast up to the year 2025.

Fourth Step of Future Expansion: (Table C-8)

The Fourth Step improvements provide for expansion of capacity beyond the requirements of the probable case for 2025. They include further enhancements in the existing facilities, coupled with a new berth face.

Proposed improvements:

- Install two 600 tph clamshell unloaders on Berth No. 4S;
- Increase dock conveyor capacity to 1,400 tph on Berth 4S;
- Add one additional berth face at a new location;
- Install two 600 tph clamshell unloaders on new berth face;
- Install 1,400 tph dock conveyor for new berth face; and
- Provide 75,000 tons additional storage capacity.

For the Fourth Step of future expansion, the same two previous berth faces plus one additional berth face at another location are proposed for the Third Expansion Step to handle this throughput.

No further additions are required at Berth No.4N. The three unloaders will be capable to handle 3.8 to 4.0 million tons per year at a berth transfer rate of about 17,300 tons per day within 220 to 231 days. The berth occupancy will range between 63% and 66%. Average cargo size is kept the same 28,000 tons as determined in the previous step.

It is assumed that Berth No. 4S and the other new dedicated berth at a new location will be equipped with two clamshell unloaders at each berth having 2 x 600 t/h free digging capacity each. These will handle 2.7 to 2.8 million tons throughput per year at a berth transfer rate of about 12,300 tons per day within 219 to 227 days per year at each berth. Their berth occupancy will range from 63% to 65% each. Average cargo size was improved to about 26,000 tons.

Thus the total mineral products throughput capacity will range from 9.2 to 9.6 million tons. There will be 348 to 356 vessels annually yielding about 26 to 27,000 tons average cargo. The average berth transfer

rate will be about 14,000 tons per day and average berth time per vessel will be about 1.9 days. Overall berth occupancy for the three berths will range from 63% to 65% and the average waiting time is calculated between 0.39 and 0.44 days per vessel.

The capacity of the conveyor system at Berth No.4S and transfer to storage, previously designed for 1,000 t/h, has to be increased to 1,400 t/h peak capacity. At the new berth a new conveyor shall be provided, designed for 1,400 t/h capacity, to receive the product from two clamshell unloaders. This berth conveyor shall transfer the product to the conveying system and to the storage facility.

With a minimum of 7 days dwell time, the storage capacity has to be increased from the previous 110,000 tons by 75,000 tons to 185,000 tons, increasing the capacity limit at 7 days dwell time to about 9.6 million tons. About 20,000 tons of these 75,000 tons storage are required in the vicinity of Berths 4N and 4S and the other 55,000 tons storage capacity at the new berth location.

Additional rail car and truck loading facilities have to be provided.

The annual tonnage of 9.20 to 9.6 million tons achieved with this system exceeds the requirements of the probable case in 2025.

Berth / Year required to meet probable case demand	2009	2016	2025
TERMINAL	**First step additions**	**Second step additions**	**Third step additions**
Berth 4N	Operate for self unloaders	4 x 250 t/h traveling hoppers 1,000 t/h dock conveyor	3 x 600 t/h traveling clamshell unloaders Increase to 2,000 t/h dock conveyor
Berth 4S	4 x 250 t/h traveling hoppers 1,000 t/h dock conveyor		
Other	Added 15,000 t storage	Added 20,000 t storage	Added 40,000 t storage

CONCLUSION: (CHART C-11)

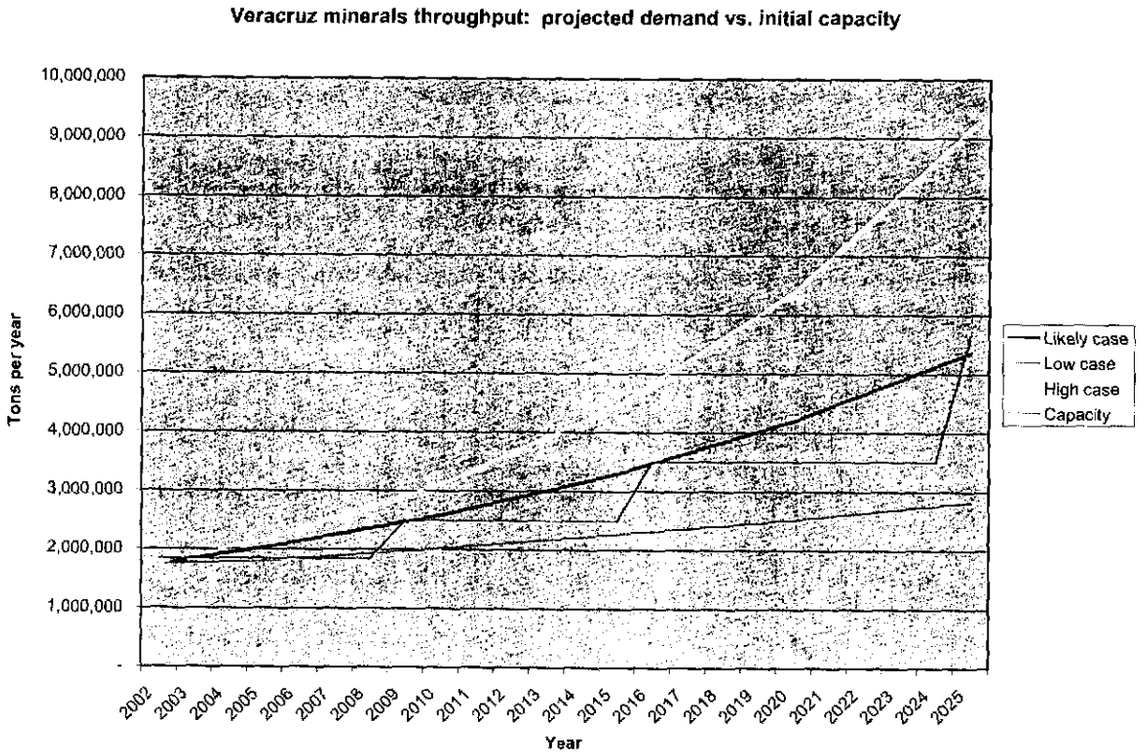
Comparing the total figures of each step with the forecast figures, we can conclude that:

- The First Step Expansion with 2.40 to 2.55 million tons (average 2.475 million tons) throughput is suitable for the Probable Forecast until 2009.
- The Second Step Expansion with 3.40 to 3.56 million tons (average 3.48 million tons) throughput is suitable for the Probable Forecast until 2016.
- The Third Step Expansion with 5.50 to 5.78 million tons throughput (average 5.64 million tons) throughput is suitable for the Probable Forecast until 2025.
- The Fourth Step Expansion with 9.20 to 9.60 million tons throughput (average 9.40 million tons) throughput is suitable for the Optimistic Forecast until 2025.

Other considerations may have an impact on the above conclusions:

- The low storage dwell time of 7 days has a great impact on direct trans-loading of rail cars and trucks. It must be ensured that there is enough equipment (rail cars/trucks) available and enough marshalling space allocated to stage empty and loaded trains and trucks.
- Allocation and area requirement of open storage and covered storage as well as location of truck or train loading stations have to be considered and further investigated.

5.6.3 Capacity vs. Throughput Demand



The figure illustrates the phased development of additional capacity to meet the likely or probable case of throughput demand of more than 5 million tons a year of minerals by the year 2025.

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VERACRUZ

6.0 Review and Prepare Site Location and Land Use Plan

The DMJM Harris team conducted a review of the site options for port expansion, following review of the evaluation prepared by APIVER. The APIVER evaluation concluded that the most suitable site is Bahia de Vergara. The DMJM Harris team including Seinpro, and Consultores Internacionales, together with APIVER visited each of the alternative sites:

- Bay of Vergara;
- Laguna de Alvarado;
- Laguna La Camaronera;
- Antón Lizardo; and
- La Antigua

Site Location and Land Use Plan

Visits to optional sites for the expansion of the Port of Veracruz.

Physical aspects.

On December 8 and 9, 2003, the following sites were visited by land and water:

Bay of Vergara, La Antigua, Laguna de Alvarado and Antón Lizardo.

6.1 General physical characteristics of the places

Although in the detailed geotechnical, seismic, topographical and bathymetrical aspects there are some differences between the sites, similar physical characteristics exist at the four sites as described hereinafter.

6.1.1 Beach sediments and their dynamics

The places present similar conditions which can be defined approximate form from previous studies carried out in the area.

Superficially, there are clean, uniform sands, which in depths of water greater than 20 m, can contain fines, such as limes and clays.

Between 0 and 5.00 m. of water depth, the mean diameter of sands ranges from 0.15 mm. and 020 mm. These diameters are observed in the areas of both strand and dunes.

The coefficient of uniformity of these sands is from 1.50 to 1.70. At depths between 10.00 and 20.00 m, the mean diameter falls to the order of 0.10 mm, with a similar coefficient of uniformity.

The coastal transport for dominant surf is from north to south or from west to east, according to the orientation of the beach. It has been considered to be of the order of 280,000.00 M3/year. This should be taken into account so that the accesses and navigation channels are protected by means of jetties. It should be pointed out that the experience in this area indicates that there are surfs caused by northern winds known as "nortes", between the months of November and March, which are responsible for most of this coastal transport.

6.1.2 Eolic transport generated by wind in areas of dunes

In the sites visited, there are dunes of between 5.00 m. and 30.00 m, covered partially with vegetation in accordance with the more detailed description made for each site.
Eolic transport has been evaluated, in parts of the Gulf of Mexico, in dunes of between10.00 m. and 20.00 m. high, without vegetation, with equations obtained in function of measurements, as:

$Qe=5.10 \times 10^{-6} v^3$ (m / hour x m.) for wind speeds less than 5.8 m/sec.

$Qe = 2 \times 10^{-3} v^3$ for wind speeds greater than 5.8 m/sec.

Using these equations, obtained by means of measurements of wind and of the eolic transport measured by means of sand traps, as well as wind data of the U.S. Naval Weather Service Command, it is estimated that one kilometer of approach channel, surrounded in both banks by dunes without vegetation, can trap in one year approximately 200,000 m3 of dune sand.

6.1.3 Deposit of sand in approach channels without protection of jetties

In the area in study, important reductions in the cost of jetties can be achieved, if the ends of these are not displaced to the maximum depth at the offshore entrances to the navigation channels. This results, however, in a need to execute maintenance dredging which, besides being a deferred cost, can be much smaller than the costs of the expensive extensions of jetties to great depths.

In order to determine, the most suitable depth from the standpoint of cost, of the ends of the jetties, in front of the port, subject to conditions of surf and currents similar to those of Veracruz, a study was carried out of a test trench. This trench was built between the depths of 11 m and 14 m, with a length of 1,000 m and a width of 150 m at a depth of 20 m. The trench was completed in October of 1980.

The slopes after the dredging were 7:1. These banks began degrading until reaching a maximum of 43: 1 at the end of the period of observation in July of 1981. Besides the degradation of banks observed by means of bathymetrical sections, there was blockage due to the transport of sand induced by surf and currents, which should be similar to which happens in Veracruz at the same depths.

It was concluded that the degradation of banks was due in part to collapses possibly caused for lost of resistance of the sands at the cut, from the effect of the surf. The blockage was due to the transport of sand carried out by the surf and currents, mainly during the period of surfs from the north.

It was estimated that the volume of collapses was 65,000 m3 and the blockage was of 263,000 m3 in the 8.20 months of measurements. Approximately 90% of the blockage happened in the months of October, November and December of 1980, the period during which the maximum surfs occur generated by the "nortes" (north winds).

By means of a rational theory calibrated by means of the measurements, the annual capacity for blockage by meter of length of a navigation channel unprotected by jetties was considered to decrease with the depth of the superior shoulders of the channel, that is to say the depth before the construction of the channel and in m3/meter of channel per year would be:

Depth in meters =	12	13	16	19	22	25
M3 to dredge x meter x year =	524	394	198	102	26	2

These data allow consideration for a navigation channel of a certain depth, length and for different depths of the ends of the jetty, the cost of maintenance dredging and the cost of the protection works.

6.1.4 Surf.

In the area three types of surfs should be distinguished.

A. - Normal surfs. These surfs are of relatively reduced height, up to 1.50 m, with short periods of 5 to 8 sec. These surfs are generated by local winds. They happen the whole year, when there are not "nortes," storms or tropical hurricanes. Their direction encompasses the range from northwest to the southeast. These surfs do not affect the maneuverability of the ships in the accesses and they produce currents and beach sediment transport of little importance.

B. - Surfs generated by the winds called "nortes," these are winds generated by cold fronts originating in the north. This occurs in the months of November to March. These winds produce surfs that can reach heights of 6.00 m. with periods ranging from 8 to 10 sec. These surfs are the ones responsible for most of the sediment transport, the beach one, up to depths of 6.00 m. and originated by the surf and the coast, this to depths of 6.00 to 20.00 m. and which is influenced as much by the waves as for the currents. The surfs affect in a significant way the maneuverability of the ships in the accesses or navigation channels, for what the address of these channels it is generally governed by the directions of these surfs that have range in direction between the northwest and the northeast.. The statistics of these surfs as to height, direction and period serve to choose the most suitable direction for the navigation channel at each specific place.

C. - Hurricane surfs. When tropical storms, generally originating in areas of warm water, such as the Caribbean, change into hurricanes, different intensities or degrees are produced. In the area that concerns us and in the last 50 years, four hurricanes of degree H-2 have occurred.

Considering that the external works of a port they should be designed with hurricane surfs for a period of recurrence of 75 to 100 years, the design surfs should be deduced by means of statistical methods that fortunately exist, together with statistical tools and empiric-rational methods.

For example by means of these methods A.H. Glenn and Associates of New Orleans, for Tampico and Coatzacoalcos, at distances of 200 km to the north and 400 km to the south of Veracruz respectively, calculate, for a period of recurrence of 100 years and to 25 m. of depth, a wave train with a maximum height of 15.64 m., and with period of 16.00 sec. in both ports.

We have calculated with the statistical method of Springall, for the port of Veracruz and for a return period of 100 years that the maximum height would be 16.54 m. in deep waters, that is to say depth greater than half the length of the maximum wave. In this same prediction, the significant height, of the group of waves generated by the same hurricane, would be 7.87 m. The probability of occurrence of a hurricane in one year is of 24.4%. It should be pointed out that the height and maximum period calculated for Veracruz agree quite well with the calculated ones for Glenn, if it is considered that these were calculated for the depth of 25 m.

The groups or trains of waves generated by a hurricane they are of unpredictable and three-dimensional character. This means that, when a hurricane approaches the port, waves can develop of different directions, with periods and heights of same or less than the maximum.

As in our case, the ends of jetties are displaced to lesser depths than those corresponding to the break of the maximum wave, since an economic depth should be selected for the displacement.

For the time being, subject to study of each structure and approach channel in particular, a depth of 12.00 m is considered, starting from the MLWL, taking into account the values of different possible blockages of the channel to different depths given previously.

To this depth and if we design with maximum heights and period of return of 75 to 100 years, the design of the elements of armor, will be made with the maximum height and period that can break on the

structure under unfavorable conditions, to avoid the premature failure of the structure, as much at the ends as in the middle of the jetty.

6.1.5 Design of breakwater or jetties

In the ends of the jetty, with displacement to 12.00 m of depth, waves of the order of 15.00m of height can break. If we consider the depth of 12.00 m, the wave height would increase due to the effect of the tides, astronomical, storm and from differences of atmospheric pressure, when a hurricane occurs.

The interior body of ends and jetties would be formed with natural rock that can be extracted from the banks of the "tuxtlas," near to "catemaco" and transported by means of barges.

The armor of the heads and the body of the jetty will be formed with artificial elements made of concrete. Two layers of armor elements are recommended, the use of only one layer of armor element is deemed to be of high risk, since the failure due to wave uplift or structural breakage of a single element can lead to considerable damage of the breakwater or jetty.

The selection of the type of armor elements should be made based on efficiency from standpoint of hydraulics (uplift caused breaking waves), and of structural resistance.

Although the Core-Loc type, according to the suppliers, holds together well, and therefore has a high coefficient of stability and they recommend a single layer, this should be studied with a critical eye. It is required that the coefficients of stability, for the employment of the Hudson formula, for example, be endorsed by an institution of prestige and considering their behavior in prototypes. On the other hand, we ignore their behavior from the point of view of structural breakage, that is to say the possible breakage due to impact of some of its components. Placing them in a single layer means to design for zero degradation and does not allow for extreme wave conditions.

Another armor element for to consider and that it has been broadly studied and endorsed is the dolosse. This element has the same coefficient of stability for the body and inferior for the muzzle, compared with the Core-Loc, something that attracts attention.

It is recommended to use the dolosse in two layers, which allows design with some percentage of degradation by extreme conditions of surf.

These elements were studied by Paape in 1980 who conclude that the highest tensile stresses in the embedment of the feet end up being of 40 kg/cm2, when the element is subject to the maximum impacts generated by the break of the surf. The dolosse studied by Paape were of 40 metric tons. Making use of the laws of similarity and considering that the impact forces are directly proportional to the weight of the element and to the lever arm when the impact is exercised on an end, the maximum tensile stress can be calculated on elements of different weights.

This way for example for a dolosse of 30 tons, which is the weight required in the area of the heads of the jetty, the highest tensile stress would be 26 kg/cm2, which can be resisted by a concrete element with a density of 300 kg/cm2. This can be considered as concrete of high strength, with high consumption of cement, around 350 kg of cement per m3 of concrete.

The proposed breakwater considered in this study would use Core-Loc armor blocks.

6.1.6 Tides and currents.

The astronomical tides in all the places visited are of the order of 60 cm., so that except for the Alvarado site, they are of little importance. In the lagoon of Alvarado, the tides generate tidal currents of *importance due to the filling and emptying of the lagoon, and that they should take into account for the* stability and blockage of channels and basins.

Of great importance for the design of external works and levels of safety in the port are the storm tides generated by hurricane winds over the ocean surface and the tide produced during hurricanes due to fluctuations in the atmospheric pressure. For each particular site, these tides should be studied and added to the maximum astronomical tide. We can anticipate that the sum of these effects will be of the order of 2.00 to 2.50 m. in the sites studied.

Stress should be placed on the fact that the rise in the sea level should be taken into account when selecting the design waves of the external works and of the elevation of the crown of these works in case it is not permitted for the waves to overtop the crown of the breakwater.

The ocean currents and tides in general have little importance in the design of the port works in the places visited. Not so the currents generated by the surf and the currents induced by the wind in the surface of the sea. These latter are of great importance during the occurrence of the "nortes" and they affect the degree of blockage in the navigation channels outside the jetties, as well as the maneuverability of the ships in the approach channel to port.

6.1.7 Seismicity of the area.

The area of the possible options for the expansion of the port of Veracruz is situated in zone 2 of the map of seismicity of the Mexican republic, although it should be pointed out that the River of La Antigua is for practical purposes in zone 1.

For a period of recurrence of 75 years, an earthquake with intensity 8.00 in the modified Mercalli scale is to be expected. For zone 1, the intensity would be 7.00 and the basal horizontal accelerations would be 0.15g and 0.07g respectively. The vertical acceleration should be taken into consideration as 40% of the horizontal acceleration.

In the event the port project is taken to the design stage, consideration should be given to carrying out a study of seismic risk for the selected site. Especially, the design spectra should be obtained taking into account the possible amplification of the seismic accelerations due to the stratography of the existing soils and which in some of the sites, such as in the case of the Lagoon of Alvarado, can be worthy of *consideration.*

6.1.8 Geotechnical and foundations aspects.

As for the land areas, it can be said that they are formed by deposits of sand, with reduced contents of fines and eventually with collation of limes and clays. However, in the lacustrine and fluvial areas, the content of fines is increased, as well as of the collations or layers of material of limes and clays, these generally with organic contents.

Absent studies of soil mechanics in the places visited, mention should be made of the potential of moderate liquefaction that exists in the natural soils between zero and five meters of depth, in soils with resistance spt. of 5 to 10 blows, which are frequent in the sites studies. So where it is necessary to dig more than 5.00 m. to reach the elevations of project, this problem is eliminated, but not so in the sand fill under water. In these fills, it will be necessary to compact with vibroflotation, columns of rock or gravel burdens or the soil can be compacted dynamically if the thickness to be compacted does not exceed about 4.00 m. Generally 20 m. below the surface, values are found greater than 50 blows spt, although on occasions there can be found potent strata of clays of medium to low compressibility.

As regards the marine soils, there is little information except for that obtained from the port of Dos Bocas, obtained with geophysical methods. In this place, about 500 km. distant from Veracruz, there were found, between 0.00 and 5.00 m. of depth, wave propagation velocities to the cut of the order of 125 m/sec. At 50 m. of depth these they increased to 350 m/sec., with Poisson modules of 0.25 and 040 respectively. This indicates soils of little resistance to the cut superficially that increases with the depth. For this port it was estimated that the heads of the jetties, with over-all heights of 17.00 m, would have total settlements of approximately 1.70 m.

The above is mentioned solely to call attention to the importance of the problem, to take it into account in the design of stability of the foundation of the breakwater and the distance between the heads of jetties and the approach channel, whose banks also present problems of collapse, as well as to consider that the settlement of jetties is very possible and that this increases with the depth of displacement.
The settlement should probably be considered in the design of the elevation of the crown, in case it is not considered desirable for the surf to spill over the crown.

For purposes of the feasibility study, it is recommended for the time being to consider the settlement of the different sections of breakwater as 10% of their over-all height. Also, berms should be considered between the shoulder of the access channel and the displacement of the jetty heads of double the height of the breakwater in the jetty head. As for stable banks of the approach channel in the area protected by jetties or breakwater, slopes of 7:1 should be considered.

6.2 Particular considerations of the visited places

6.2.1 Laguna de Alvarado.

Important rivers, such as the Papaloapan, Río Blanco, Otatitlan and other minor rivers converge, with their consequent loads of sedimants and pollutants. There are also the flood and ebb flows of the tide which have to be considered due to the great extent of the lagoon.

The present access channel to the lagoon has maximum depths of 8.00 m. The lagoon has maximum depths of 4.00 m. Historically, the Camaronera Lagoon has had communication with the sea at 3 points, which permits the entry of salt water and the proliferation of various fish species, which inhabitants of nearby communities take advantage of. These openings to the sea were closed permanently when the railway and coastal highway were built. These resulted in an increase in the sweet water and a reduction in salinity, which brought as a consequence that various species which previously inhabited the location disappeared and others were reduced in quantity.

A few years ago, a connection to the sea was opened by means of two 2 m diameter pipes. These tubes pass below the highway in the vicinity of Luís Martínez village and have resulted in some improvement to the situation regarding salinity, and the number of species in the lagoon has increased, which has permitted resumption of the fishing activities. It should be mentioned that this is only a partial solution, in that only the area of the lagoon in the immediate vicinity has improved.

Of the places visited in this lagoon, the best is without doubt the one called "Camaronera." The following advantages can be enumerated in comparison with other places inside the lagoon:

A. - Jetties similar as to cost compared to those it would be necessary to extend at the site of the present outlet. The present jetties are short, and have been surpassed by the transport of beach sediment. The bar formed is unacceptable for navigation purposes.

B. - The channel of communication with the sea would be relatively short.

C. - The port area could be isolated from the rest of the lagoon in such a way as to impede the entry of blockages to navigation channels and basins, resulting from the currents and movement of silts inside the lagoon.

D. - Relative proximity to the port of Veracruz and isolation from the activities that are carried out at present in the port of Alvarado.

The disadvantages compared to the other places visited, Antón Lizardo, Bay of Vergara and La Antigua:

A. - *The depths of this lagoon body are small in relation to the required ones in channels and port basins,* so that in practical terms there would not be a savings in dredging.

The Development Council of Papaloapan (Consejo de Desarrollo de Papaloapan has a bathymetric study which was carried out in 2002. The lagoon is approximately 2,000 ha. The average depth of 1.9 to 2.0 m and the maximum depth is 3.0 m. This study is called: Updating of the executive project of the road *bridge and channel connecting the Camaronera lagoon with the Gulf of Mexico and the environmental* impact study. Contract: CODEPAP/JURIDICO/26/2002, carried out by FRISA Ingeniería.

This Project was approved already by SEMARNAT in April, 2004, and costs approximately 45 million pesos (the Project was found to be feasible). With this project, the flow of the water from the sea to the lagoon would be improved and it would permit restoring to some degree the conditions which originally existed in the lagoon. The Camaronera and Alvarado lagoons have swamps and mangroves which are considered critical areas.

Personnel from CODEPAP affirm that the depth of the Alvarado lagoon has also been diminishing due to the large quantity of suspended material, and that most of the lagoon has depths less than 2.0 m.

B. - The materials to be dredged would be difficult to use as fill in wharves and port yards, as a result of the nature of the materials of lagoon deposits, with organic materials and others difficult and expensive to compact. Great parts of them would have to be disposed in dumps or waste banks with the consequent effects on bordering areas and the environment, although a solution similar to the proposal for La Antigua could be studied.

C. – Effects on the lagoon hydrodynamics, with partially unknown results at the moment, but they would surely include a reduction of the prism of tide that goes by the present mouth, which would result in the reduction of the hydraulic surface area in the present bar and that to could even result in total closure during severe low water and with dead tides.

Presently, the tide and salinity enter near Tlacoltalpan, approximately 40 km. Opening a channel in La Camaronera would the tide and salinity of this zone. Through the existing sewer pipe in this site water flows out from the high levels of the lagoon, due to storm tides or extraordinary drainages in this zone. Eventually, the extreme storm tides could induce sea currents to the lagoon through this pipe, if the dunes which cap the canal were broken, in conjunction with waves.

D. - The jetties could cause strong erosions of the coast to the southeast of the jetties, if not prevented appropriate supplementary measures.

E. - It would be necessary to study the hydrodynamic impact and the way of attenuating it, inside the lagoon. The study would be accomplished by means of a program of measurements and a hydraulic model of the lagoon system. These studies would be expensive and would require of about 18 months to carry out.

F. – Impacts on the swamps and the lagoon environment including the fishing activity.

The condition of the lagoon at present is fair with the elements mentioned previously. There are fishing activities in the lagoon which are increasing thanks to a program which has been in development by CODEPAP and their projects in the lagoon. According to the coordinators of CODEPAP, the swamps and mangroves in the zone would also be affected by construction of the port.

G. – *Moderate to high potential for liquefaction of lands that were not compacted at a relatively high cost.*

H – Seismic risk greater than the other places visited. This is due to the presence of soils of lacustrine deposit.

I. - Requirements of urban infrastructure and roads as noted in the study of INOPESA. The Port would require major investments in road and rail access, as well as urban infrastructure.

Highway 180, which is two-lane paved highway, passes along the bar of the lagoon, approximately 1 km from the site.

The nearest 4-lane highway is the Cordoba-Veracruz expressway, the junction of which is 34 km away.

A railway passes on the bar in front of the lagoon. This railway, which goes up to Alvarado, is out of service and is being abandoned. The major rail line which currently goes to Veracruz is at a distance of approximately 54 km.

The nearest city with services is Alvarado, located 19 km from the Camaronera lagoon (along the coastal highway to the south). There are some localities near the lagoon such as: Camaronera, La Conchita, Luís Martínez, Nanche Uno and Nanche Dos, but these localities barely have basic service.

Second and third-class bus service operates between Alvarado and Veracruz.

Other points near the Camaronera Lagoon where the a town could be established are Rincón de Palma, at a distance of approximately of 20 km, and Salinas approximately 8 km to the north of La Camaronera, these localities are hamlets, which would need complete urbanization works in order to receive population, as well as the installation of urban appurtenances and services, were major port facilities developed in this location.

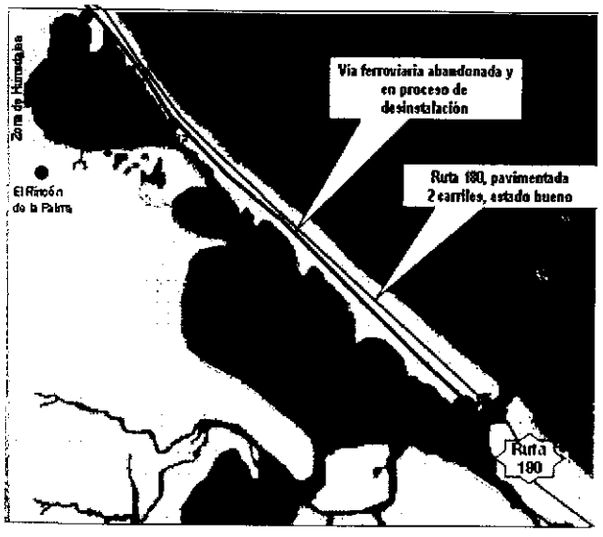
According to management staff at CODEPAP, developing a port in Camaronera or Alvarado would be devastating for the swamps and mangroves of the zone, in addition to being very expensive, because the level of suspended material in the catchment area of the rivers which flow together there would be extremely high.

In addition, the major highway bridge which would have to be constructed over the channel would by of the type and size known as Coatzacoalcos II. It should be taken into account that maintaining the land communication to Alvarado would require construction of a bridge which would cross the access channel, which would be of large dimensions.

As for the advantages:

A. - Relatively short jetties of straight axes and of the convergent type that can be overtopped possibly on their crowns in the event of extreme surfs could be used, similar to of those of Coatzacoalcos. The jetties would have probable development of about 3000 m in total, to arrive to at the bathymetry of –12 m. The maximum height at the ends of the jetties would be of the order of 15 m.

B. - Little impact on urban areas.



6.2.2. - Antón Lizardo.

Disadvantages in relation to Bay Vergara and La Antigua:

A. – The presence of dunes up to 30m in height would make it necessary to movement of about 100,000,000.00 m3 of earth at a very high cost this early, with little use as fill it, and would require places for disposal with the consequent cost of impacts on lands used for other purposes. There would also be strong impacts on the environment. In this place one cannot dump waste materials into the sea due to the presence of reefs. When carrying out major excavations, the cuts to carry this out would leave open faces in the dunes. It is estimated that during the first two years these dunes, partly without vegetation and for eolic transport, channels and dunes would carry away material on the order of 200,000 m3 per year.

It should be noted that the sites considered in the previous study, there are dunes more than 30 m in height. It would be necessary to analyze and selecting the exact site to know the contour elevations, which could be between 5 and 10 m at least. The volume to be excavated was obtained from the previous study, but could be lower at sites with lower elevations.

B. – Impact on the marine atmosphere of the presence of reefs.

The reefs at this location are coral reefs, making up the Veracruz Reef System, and are categorized as a biosphere reserve. The are located in front of Antón Lizardo point, at approximately 20 km to the Southeast of the Port of Veracruz They are all situated above the isobar of 50 m and constitute the following reefs: Giote, Polo, Blanca, Punta Coyol, Chopas, En Medio, Cabezo, Rizo, Santiaguillo, Anegada de Afuera, Anegadilla, Topatillo.

C. – Impact on human *settlements in the area.*

In Antón Lizardo, there exists a settlement of approximately 40 ha. This locality had 6,396 inhabitants, according to the INEGI census of 2000.

The area of Antón Lizardo is of an urban character due to its proximity to the urbanized zone Veracruz—Boca del Río, the number of inhabited housing units is 1,220, the type of housing is low or medium, and there is piped water to 916 units. Based on governmental data from 2000, in accordance with Conapo,

the growth in the city of Alvarado was 2.729% up to the year 2004. The area has all of the basic services. The Naval Military School "Heroica" is also located here.

D. - Requirements of urban and road infrastructure in accordance with the study of INOPESA.

Highway Route 140 reaches Antón Lizardo, but there is no rail access to this location. The nearest point along a rail line is located at a distance of 27 km from Antón Lizardo.

The closest main highway, which links the conurban zone Veracruz-Boca del Río to Antón Lizardo, is a 2-lane road. The nearest 4-lane highway is the expressway between Córdoba and Veracruz, located 32 km away.

The nearest railway line is the one from Veracruz to Paso del Toro and Tierra Blanca 30 km from Paso del Toro.

The most important urban settlement closest to Antón Lizardo is Boca del Río, at a distance of 18 km, which is to say it would be necessary to develop housing in Antón Lizardo if the Port expansion were constructed there.

As for advantages:

A. - Similar jetties to of those of Alvarado.

For Antón Lizardo, 2 straight converging breakwaters would be needed, 1,500 m in length each.

B. - Relative proximity to the current port of Veracruz.

Other than the route through Antón Lizardo and its areas of tourist and residential development, there is an alternate route. To reach Antón Lizardo, it is necessary to cross the Jamapa River. The alternate route is: from Antón Lizardo to Boca del Río, up to crossing the river there is a 2-lane highway (San Julián – Santa Fé – Paso del Toro of 2 lanes) before reaching San Julián up to the point north of Veracruz at the junction with the 4-lane Cardel-Veracruz expressway. The alternate route passes near the Bruno Pagliai industrial park.

C. - Construction of wharves with bulkheads without the need for onerous compacting.

D. – Low seismic risk and good soil characteristics. There would not be problems of liquefaction of soils.

As was mentioned previously, the nearest rail line is in the Paso del Toro village, approximately 30 km away. Paso del Toro is directly connected to the main line from the Port of Veracruz at some 16 km.

Antón Lizardo is situated at a distance of 27 km from the junction of the Córdoba-Veracruz which is the road access to the present Port of Veracruz.

The road access to Antón Lizardo from the Center of México is similar to the access to the Port of Veracruz, on the shortest route México-Puebla-Orizaba-Córdoba-Veracruz, and reaches the southern part of the urban zone of Veracruz-Boca del Río near the highway to Antón Lizardo.

6.2.3 Bay of Vergara.

Disadvantages:

A. - Great development of breakwater, although this study define in Section 8 an adaptation of the previous project, which reduces the breakwater length by more than half in the first phase, as well as displacing it to shallower water.

The construction of the breakwater in stages is feasible, with the northern portion of the breakwater being developed first, to protect the proposed new container terminal at the northern end of the Bay of Vergara. For a container terminal, a breakwater is needed of 2.50 km length, with a jetty at a depth of 12.00 m. This breakwater plan provides a more than 50 percent cost reduction over earlier schemes.

B. – A great part of the body of the breakwaters would be displaced to relatively great depths and would have to be designed for wave heights on the order of 10 to 14 m. with heavy concrete armor elements weighing from 20 to 30 ton.

C. – In order to avoid the surf overtopping the crown of the breakwater and to avoid agitation and undesirable currents in the port, the breakwater would need to have maximum heights close to 20 m.

D. – Substantial settlement in most of the breakwater close to 2.00 m. in the area of the heads of the jetties.

E. - The fill for platforms of wharves and yards would be made with products of dredging. These fills would be partially executed underwater, and their compaction by means of vibroflotation or columns of gravel and rock would be extremely expensive.

F. - The containment walls would have to be executed with more expensive construction procedures than for bulkheads built on land. The wharves would be built using piles or containment walls. In the event containment walls were utilized, it would be necessary to compact the fills underwater.

It is considered in any case that the costs of wharves and yards would be greater than for the case where these can be built with bulkheads from dry land, avoiding fill with the need for compacting of fill underwater.

G. – Impact on the lower parts of Punta Grande.

It is considered that some corral reefs would be affected with a cover of living tissue which occupies the substrata which was an important bordering reef (Punta Gorda).

The coral reefs of the northern part are located in front of the Port of Veracruz, all located above the isobar of 40 m, representing les than a third of the extension of the southern part, and are constituted in general by reefs of lesser extent which include the following: Punta Gorda, Gallega, Galleguilla, Anegada de Adentro, Blanquilla, Isla Verde; Bajo Paducah, Isla de Sacrificios, Pájaros, Hornos, Ingeniero and Punta Mocambo.

Apart from the cost of breakwaters, the principal disadvantage of the Bay of Vergara site may be the potential for impact on the coral reefs. If, however, there are not coral reefs at the actual development site, especially not living coral reefs, this impact may be minimized The extent of living reefs in the northern part of the bay, set aside for phase 1 container terminal development, is reportedly limited.

H. - The design of to port in this location requires much more study and further civil engineering projects beyond the existing ones. It is estimated that these studies would take substantial time and effort, and would include marine studies, seismic risk, soil mechanics, construction procedures and definitive preliminary designs, for purposes of cost evaluation.

As for advantages, there is agreement with those mentioned in the study of INOPESA.

Advantages:

There is sufficient land area available for the development of integrated logistics in conjunction with the port expansion at the Bay of Vergara.

It is possible to establish road and rail connections for the exclusive use of the Port.

The area is already designated for Port development in the program of land use for the urban area of Veracruz.

The new port development is also sufficiently close to the Bruno Pagliai industrial estate and the airport to facilitate integrated regional development.

The Port has already acquired some of the land, although additional land acquisitions are likely to be needed.

The proximity to the existing Port of Veracruz would facilitate sharing of some of the infrastructure for port operations.

The proximity to the existing Port and to the urban areas of Veracruz would facilitate access by the port labor force to the new facilities.

The following additional factors apply to the expansion of the Port of Veracruz in the Bay of Vergara:

The principal route which presently serves the Port of Veracruz is some 8 km from the area where the container terminal is located. A railroad link of approximately this same length would be required to provide a direct connection. There is an executive project for the construction of a Railroad Right-of-Way from Santa Fé which would reduce this distance.

The project to construct the Railroad Right-of-Way to Santa Fe which goes out of the Port of Veracruz, passes through the site of Bahía de Vergara and a northeast-southeast alignment over 25 km to a junction with the railway which goes to the north and at 33 km (Tejería) with the railway Córdoba-Orizaba. The rail link would connect with the Tamsa school by means of a segment approximately 1 km long.

The projected Urban Boulevard Km 13.5 (with six lanes) will be a distance of 6 km from the crossing with Route 180 Cardel-Veracruz, and 13.78 km from the junction with route 140 and 24 km approximately from the expressway to Mexico City. Upon completion of Urban Boulevard Km 13.5, there will be less road congestion than at present.

There are coral reefs as much in the northern part as in the south of the bay. The use of soils of the coastal strip of land is defined as a productive ecology. The beaches to the north are touristic. To answer this question, it is necessary to refer to environmental studies which were provided such as those of the Veracruzan Reef System, the definition of the polygonal of the park and the proposal for modification of the polygonal.

It is considered the some reefs would be affected by a cover of living tissue, which would occupy the substrata of an important bordering area (Punta Gorda). In an indirect form, there exists the risk that other complex reef systems adjoining the Port (La Gallega and La Galleguilla) could experience acceleration of the process of sedimentation resulting from an alteration in the dynamic of littoral transport resulting from the placement of breakwaters and jetties.

By its characteristics, this area will be subject to pressures from local, national and foreign ecological groups, for which reason much attention will have to be given to an outreach program to provide for their participation.

6.2.4 La Antigua.

Before anything else, it is necessary to conceptualize the project, isolating the port totally from the river. Among other reasons for doing this is the problem of sediments and pollutants that the river transports, as well as to avoid possible soils of fluvial deposit.

The river requires its own outlet and the most advisable thing is that this outlet be located to the southeast of the southeast jetty of the port. During the site visit it was possible to observe that the present outlet diverges towards the southeast, due to the interaction of the river with the transport of beach silts, which is from northwest to southeast.

With the construction of the jetties for the port and a small jetty to the southeast of the outlet, the outlet would be stabilized and its hydraulic area would be considerably increased, avoiding the formation of the bar. This last would have an additional benefit to the fishing and tourist activities. It would make it possible to include, with relative ease, the establishment of a fishing and tourist port, in the river, near the outlet. In addition, the levels of flooding would be reduced on a great portion of the river upriver of the outlet, by avoiding the backwater caused by the current bar.

It is thus advisable that a port at this site be developed totally to the northwest of the left bank of the river, avoiding insofar as possible the old riverbeds with soft fluvial or organic deposits.

The jetties would be similar to those described for Alvarado, although in accordance with previous studies, carried out partly by means of reduced hydraulic models, they could be much shorter.

The navigation channels and basins would be built in lands that at the moment are of elevation + 6m approximately. It would be necessary to study the most economical way to treat these lands, to provide the project elevation and the required resistance In case of its being required, dynamic compaction may be the best solution except in the dry fillers, where compacting would be done with conventional equipment.

As for the construction of wharves, the containment walls could be built with bulkheads built out from land, afterwards dredging channels and basins and using dredge spoils as fill.

A problem to analyze is the transport of silts of eolic type, since the dunes to the northwest of the river are little vegetated and they could, when they are stabilized or vegetated, produce sediments in basins and interior channels that, for the time being, are estimated to be of about 200,000 m3/year and that it would be necessary to dredge in the first two years.

Another problem to study is the disposition of the products of dredging that cannot be used in fill.
In the event of further work at this location, it would be recommended to study the economic feasibility of building stabilized artificial dunes close to and parallel to the beach, a form a barrier against the winds and extraordinary tides.

The possibility could also be studied of deposit in the beach, to the south of the river and to gain land by means of jetties or formation of "tombolas". These last ones could be formed by means of artificial reefs, using ships scrap or other structures of trash or by electrolytic means.

It should be pointed out that, if the project is not supplemented with appropriate shoreline protection measures, the construction of the jetties would tend to increase erosion of the coast to the south of the river outlet.

At 4 km from the site of the new port, there is a main rail line which links the center of Mexico with the port of Veracruz (Mexico – Xalapa – Veracruz) and is in good condition.

The location of the port would be barely 3 km from the Mexico City – Puebla (segment under construction) – Xalapa – Veracruz 4-lane expressway and at 33 km (on a 2-lane road) from the Mexico City – Puebla – Orizaba – Cordoba – Veracruz 4-lane expressway.

These are the two routes which at present are utilized for cargo transport to the center of Mexico.

The La Antigua River is one of those which has as its major use (demand) the water along its path. It is of great importance to study what will be the impact on the water quality in the period of low water which

decreases in an important way, for example, if the brackish water reaches upriver of where it does at present.

6.3 Findings and conclusions of site evaluation process

Following the site visits, and using information regarding road and rail access to the sites, a matrix was prepared describing the evaluation of alternatives. The factors considered in the evaluation process were:

Physical support
- Dredging
- Breakwaters and jetties
- *Fill*

Environmental aspect
- Planning instruments which regulate the environmental aspects

Infrastructure
- Road connection
- Rail *connection*
- Potable water
- Sewer system
- Telephone communications

Public transportation

Intermodal connections

Proximity to industrial parks

Urban support

Interference with existing activity

Planning instruments

Referring to the matrix, the various sites had advantages and disadvantages in terms of the need for dredging, breakwater protection, environmental impacts, road and rail access and proximity to urban areas. Other sites in addition to Vergara, such as Laguna La Camaronera and La Antigua, were considered potentially viable from the standpoint of dredging and wave protection. However, the other sites did not provide the road and rail access and other factors necessary for the port.

From the point of view of the *oceanographic aspects and civil engineering* and very possibly of required port investments, the most convenient place is La Antigua, it based on the observations carried out in the places visited and based on the experience and well-known studies of similar areas of the Gulf of Mexico. *However, considering the road and rail access, proximity to the present port and land use and access to urban infrastructure, and total investment including landside infrastructure the Bay of Vergara is the preferred alternative.*

A. – The matrix showing the evaluation of the alternatives vs. the various factors – oceanographic aspects, rail access, road access, urban infrastructure, etc. – provides the rationale for the conclusion that the Bay of Vergara is the recommended alternative.

B. – After selecting the location for establishment of the port, it is necessary to carry out a greater number of studies and preliminary designs, besides studying methods of construction, volumes and cost of work to support to feasibility study and refine the construction estimates.

Of agreement with that described previously and in relation to the waves and levels of design of jetties in the Bay of Vergara, we should point out that we consider that the preliminary design carried out by C.F.E. should be adapted and modified for the port. The design wave considered by C.F.E. has a very short return period, of the order of 10 years or smaller. A much longer return period and potentially greater design wave should be considered for the development of major port works. Also, the design does not consider storm tides resulting from design hurricanes and the surge resulting from differences in atmospheric pressures that is presented with the occurrence of the hurricane.

The required studies to carry out the preliminary designs on-site would include the following:

C.1. - Summary of information and calculation of oceanographic aspects.

C.2. - Geophysical studies of the terrestrial and marine subsurface conditions. These studies besides providing information in relation to the soils, would offer knowledge of the existence or not of rock structures in the areas where dredging is to be carried out. The presence of rock, in areas to be dredged, could significantly impact the cost of dredging.

C.3. - Preliminary studies of seismic risk.

C.4. - Topography and bathymetry where these studies don't exist.

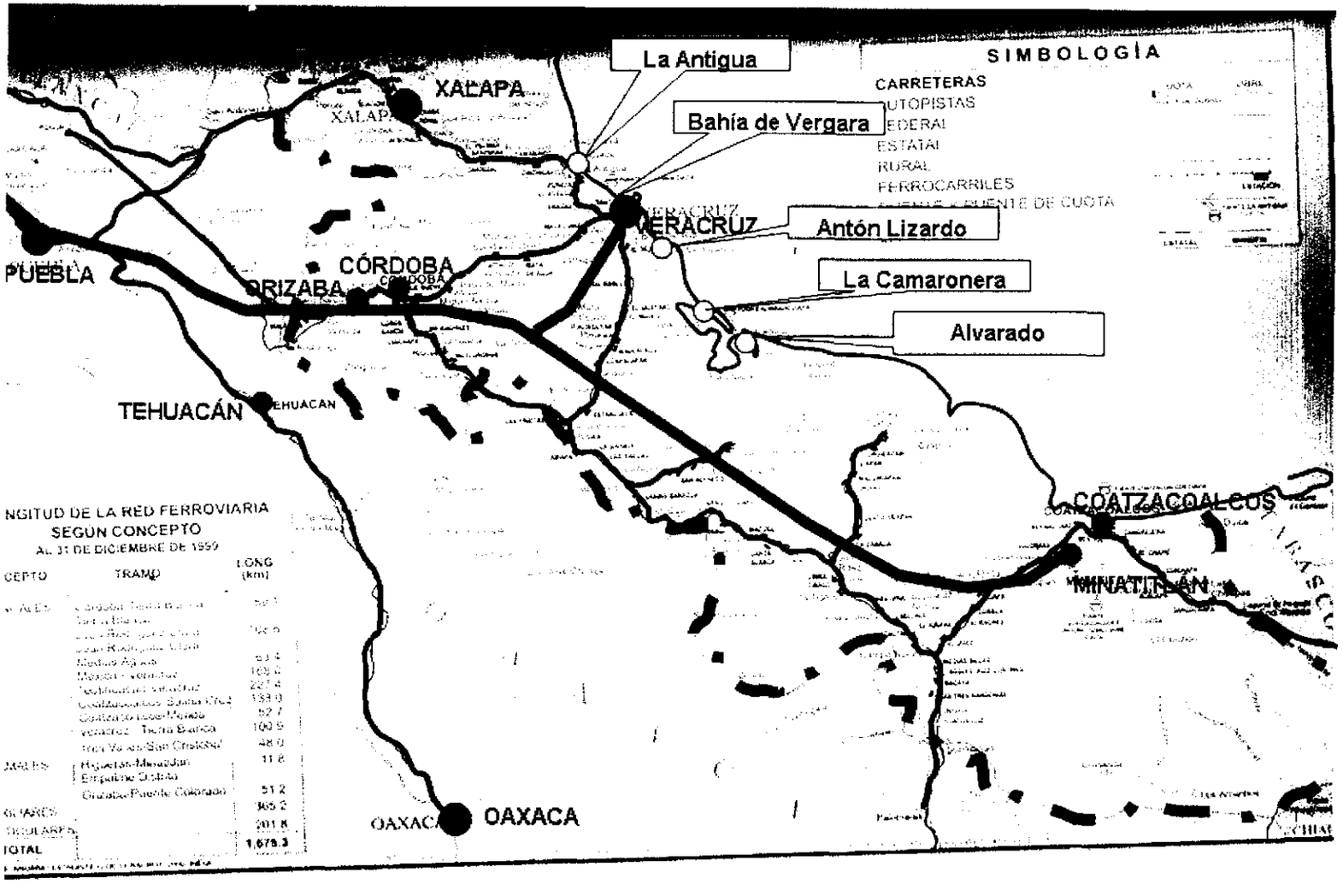
Table 6-1: Evaluation Matrix of Alternative Expansion Sites for the Port of Veracruz

Variables considered / Site	Bahía de Vergara	Antón Lizardo	Rio La Antigua.	La Camaronera	Alvarado	Observations
Physical Support						
Dredging	Dredging of channels and alongside berths	Problems in handling the dredge spoils	Permanent ongoing dredging necessary	Permanent and copious ongoing dredging necessary	Permanent and copious ongoing dredging necessary	
Breakwaters and jetties	Breakwater in stages (2500 m in the first phase)	Jetties similar to those of Alvarado; 2 straight converging jetties of 1500 m are required	2 straight converging jetties of 1500 m are required	2 straight converging jetties of 1500 m are required. Jetties similar in cost with respect to those which would have to be extended at the site of the existing mouth	2 straight converging jetties of 1500 m are required	
Fill	Only limited fill using dredge spoils along the natural shoreline is required in the revised plan prepared for this study	Inshore development which would involve cutting and dredging but does not require fill other than for leveling or stabilization	Only limited fill along the natural shoreline is required	Inshore development would require fill in a portion of lagoon	Only limited fill along the natural shoreline would be required	

Variables considered / Site	Bahía de Vergara	Antón Lizardo	Río La Antigua.	La Camaronera	Alvarado	Observations
Environmental aspect	Punta Gorda Dead coral ref.; limited effect on La Gallega live coral due to shifting of currents	Marine Park Veracruz Coral Ref. System (SAV) Coral reefs in very good condition. Marine area adjoining access considered an important reserve zone of coral reef		Protected humid zone and ecological preserve in the immediate area of the Lagoons of Mandinga and La Redonda		
Planning instruments which regulate the environmental aspects	Belongs to the SAV coral reef system	Belongs to the SAV coral reef system		RAMSAR, Possesses a Program for ecological improvement and rehabilitation of the Camaronera Lagoon		

Variables considered / Site	Bahía de Vergara	Antón Lizardo	Río La Antigua.	La Camaronera	Alvarado	Observations
Infrastructure						
Road connection	*** 3 km from the proposed site to the Cardel-Veracruz Expressway; 25 km. to theCórdoba Veracruz Expressway	45 km from the proposed site to the Córdoba-Veracruz Expressway	2 km from the proposed site to the 4-lane Cardel-Veracruz highway; 35 km to the Córdoba Veracruz Expressway.	48 km from the proposed site to the Córdoba-Veracruz Expressway.	53 km from the proposed site to the Córdoba-Veracruz Expressway.	***Has a special project (13 ½) of 6 lanes which links the proposed site of Bay of Vergara with the principal roadway going to the Bruno Pagliai Industrial Park and the Airport which connects to Tejería
Rail connection	Has a special project (linkage to Santa Fe)	No rail connection	3 km from the proponed site (Veracruz-Jalapa segment)	No rail connection	No rail connection	
Potable water	Supply of surface water from the Jamapa River 47 million m3 per year (extracted for the city and the port)	Supply of underground water	Has a supply of underground water	Has a supply of underground water	Has a supply of underground water	
Sewer system	Has sewer service	No sewer service	No sewer service	No sewer service	Has sewer service	

Variables considered / Site	Bahía de Vergara	Antón Lizardo	Río La Antigua.	La Camaronera	Alvarado	Observations
Telephone communications	Available	Available	Not available (the nearest is at 4 km distance)	Not available	Available	
Public transportation	Available in abundance	Available	Available	Available	Available	
Intermodal connection	Airport, road, rail and port are very near	Not available, only road.	Not available, only road	Not available, only road	Not available, only road	
Variables considered / Site	**Bahía de Vergara**	**Antón Lizardo**	**Río La Antigua.**	**La Camaronera**	**Alvarado**	**Observations**
Proximity to Industrial Parks	P- I. Bruno Pagliai 15 minutes (18.5 km) from the Port	Not available; 56.5 km from Bruno Pagliai	19.5 km from Bruno Pagliai	Not available; 59.5 km from Bruno Pagliai	Not available; 60 km from Bruno Pagliai	
Urban support	Available	Not available	Not available	Not available	Not available	
Interference with other existng productive activities	There is artisan fishing activity	Would compete with artisan fishing activity, ecological tourism and underwater swimming which exists in the location	Would compete with the artisan fishing and ecological tourism activity which exists in the location	Would compete with aquaculture activity in the Lagoon	There is artisan fishing activity	
Planning instruments	Possesses a program which envisions its existence and use as a reserve for support to port activities	Does not possess an urban planning instrument	Does not possess an urban planning instrument	Does not possess an urban planning instrument	Does not possess an urban planning instrument	


La Antigua
Bahía de Vergara
Antón Lizardo
La Camaronera
Alvarado
SIMBOLOGÍA
CARRETERAS
XALAPA
VERACRUZ
CÓRDOBA
ORIZABA
PUEBLA
TEHUACÁN
COATZACOALCOS
MINATITLÁN
OAXACA
NGITUD DE LA RED FERROVIARIA
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AL 31 DE DICIEMBRE DE 1999
LONG (km)
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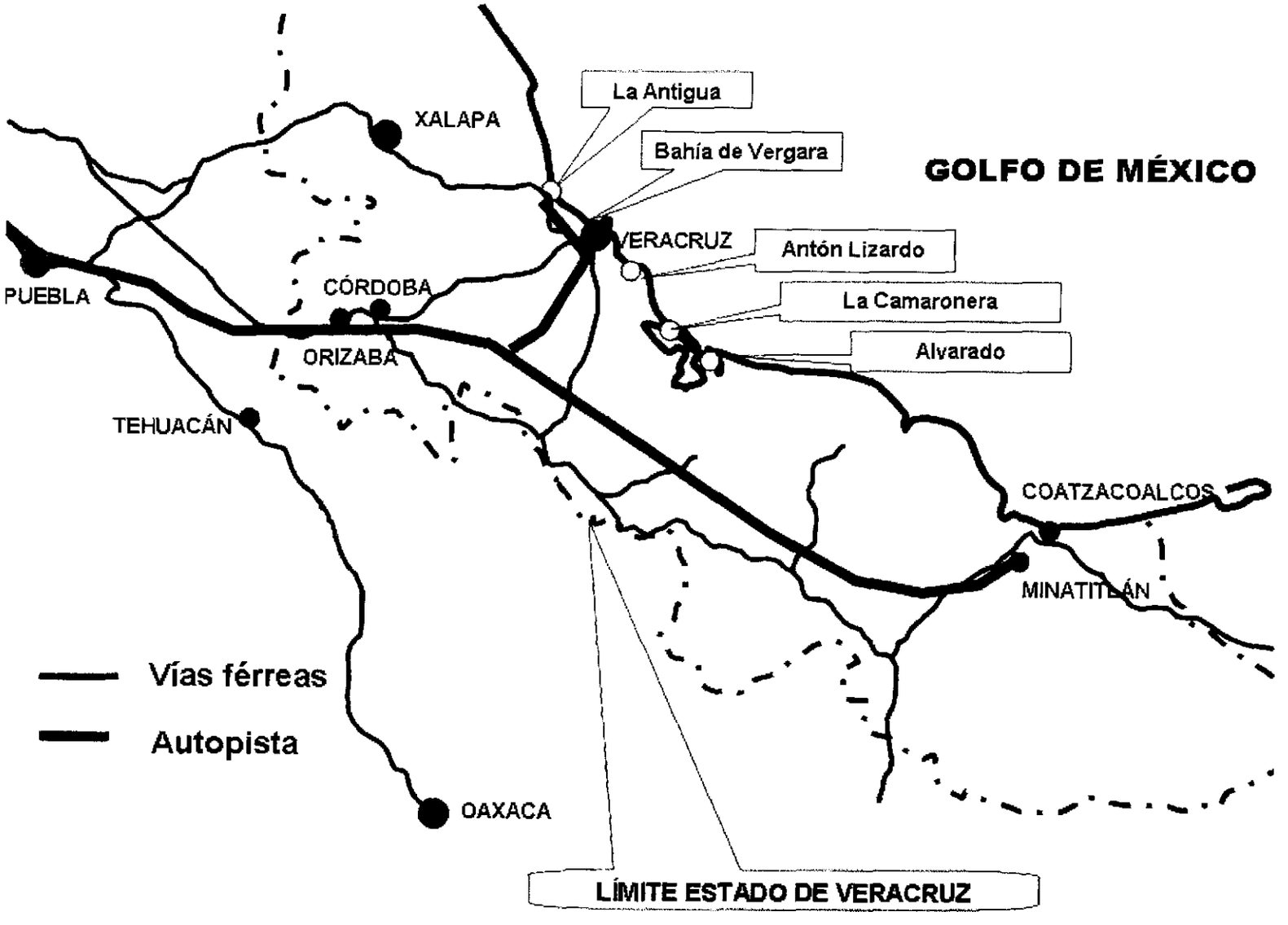

GOLFO DE MÉXICO
La Antigua
Bahía de Vergara
XALAPA
VERACRUZ
Antón Lizardo
La Camaronera
Alvarado
PUEBLA
CÓRDOBA
ORIZABA
TEHUACÁN
COATZACOALCOS
MINATITLÁN
OAXACA
Vías férreas
Autopista
LÍMITE ESTADO DE VERACRUZ

DMJM HARRIS | AECOM

VERACRUZ

7. Review and Evaluation of Environmental Study

7.1 General

Within this Section, the relevant environmental aspects related with the Project for the expansion of the Veracruz Port at the site denominated as "Bahía de Vergara" (Vergara Bay) are shown.

The analysis of the environmental aspects was performed taking into account diverse documents that contain the studies related with the project for the expansion of the Veracruz Port, but mainly, taking as a basis the ""MIA" EIS (Environmental Impact Statement) elaborated by the company Procomar, S.A. de C.V.- That "MIA" was elaborated for a project of expansion at the Bahía de Vergara site which considered the use of all the Bay for the expansion of the Port, by means of the construction of two jetties (Breakwater), the dredging of navigation channels and maneuvering basin, and the filling of the dock and adjoining areas for the construction of the land infrastructure.

In the current study, an updating was made as well as optimization of the existing installations and future needs, towards the year 2025, in such a fashion that within the new expansion proposal, only the north portion of the Bay is being taken advantage of, which is equivalent of using only 60% of what the previous proposal required, and only the construction of one breakwater (at the north) is required, the dredging for the navigation channel and maneuvering, and the filling of the dock and adjoining areas, for the construction of the landside infrastructure.

After reviewing the mentioned "MIA" statements, we arrive at the following general conclusions:

a) The Project continues being considered as environmentally feasible.

b) The MIA continues to be valid in its general content, that is, the environmental reference frame continues to be the same, within the fundamental aspects, and it maintains a good portion of the considerations on the impacts that the Project will produce during the previous phases of construction and operation, as well as the prevention and mitigation measures of the impacts thereby proposed.-

c) There is a reduction of the surface that is being used compared to earlier plans, and since this surface is located in the north end of the Bay, the impact on the reefs "La Gallega" and "La Galleguilla", once the proposed prevention and mitigation measures are put into practice, will be less than what was foreseen in the referenced study.

d) Since the expansion now being proposed considers only the handling of freight in containers, the impact during operation will be less than for the previously proposed scheme, because the activities related with handling containers do not imply risks of possible liquid spills or emission of particles into the atmosphere.

e) During 2002, a Partial Urban Development Plan for the north of the city of Veracruz was published considering the use of soil consistent with the Port activities, in the zone adjoining the expanded Port. Previously, this zone had a soil use denominated as an Ecologic Reserve, which was inconsistent with the Port Expansion Plan.

f) Recently, the Water Commission for the State of Veracruz has concluded the rehabilitation of diverse waste water treatment plants, among them the one that discharges into the Vergara Bay (CRAS), with which, the contaminant point that previously constituted a threat was eliminated. This point has now been turned into an opportunity, as the re-use of treated water could be promoted in the operation of the Port Expansion, for use in the irrigation of green areas as well as the washing of equipment and paved areas.

g) It should be noted that the condition still persists, that for the development of the Project, the Integral Port Administration of Veracruz (Apiver) will require the corresponding authorization for

the delimitation and concession of the maritime area and federal maritime and land areas to be occupied, and, given the fact that the maritime area is located inside the polygon of the National Park denominated Veracruz Reef System "Sistema Arrecifal Veracruzano", it will also be necessary to obtain the approval from the authorities in charge of this Park.

7.2 Description of the Works or activities, of the programs or partial development plans

7.2.1 General Information on the Project

The Project for the Expansion of the Port of Veracruz consists of a series of works considered in the near, medium and long term, tending to create a Port area in the Vergara Bay adjacent to the current port. The area will be delimited in its maritime portion by a breakwater that will be based on rocks and prefabricated concrete elements, that will allow the establishment of a channel for the access to the port. The depth of this channel as well as the drafts alongside docks will be obtained by dredging. The material produced by this will be used for the required fill, for further establishment of the diverse Port terminals considered in the project. These fills will be delimitated by means of retaining walls. Finally, in order to provide the container terminals with value added areas, a portion of the land adjacent to the bay will be leveled and cleared.

Within the associated Works or activities we have, on one hand, the exploitation of a bank of material in order to supply the same to the Works (the breakwater), and on the other, the necessary railroad and highway connections required for the mobilization of freight, the required works and installations required for the supply of electric power services (transmission line and/or electric station), drinking water and sanitary installations; as well as the required maritime signal system for the operational stage.

Given the nature of the Project, the Works and/or the indicated activities fall within those ones that require the authorization from the Environmental and National Resources Secretariat (SEMARNAT), on Environmental Impact matters, since these are considered in Articles 28 of the General Law for Ecologic Balance and Environment Protection (LGEEPA), and Article 5th. Of its Regulation of the matter of Environmental Impact Evaluation..

The Works considered within this environmental analysis are:

- Breakwater
- Dredging of navigation channel and dock.
- Retention Walls for the fillings in the maritime zone
- Filling and leveling in the maritime area
- Clearing and leveling of land
- Internal roadway and railroad connection

The associated Works and/or activities are

- Maritime Signal System
- Railroad Connection
- Roadway Connection.
- Services Supply (electric power, drinking water, sanitary installation).
- Construction and operation of Port terminals

According to the analysis performed in this Study, in order to be able to face the growing demand of the freight loading, unloading, handling and storage, it is necessary to perform two actions, considering a planning horizon to 2025.

1. To make optimum use of the existing installations at the port, which requires counting on an adequate space in the Port installation, and increasing the installed capacity of loading and unloading equipment.

2. To supply a new installation for the handling of containers, which must be ready by the year 2010. This new installation is to be located in Vergara Bay.

It is necessary to clarify that the expansion of the Veracruz Port is considered as a need in the short, medium and long term, based on a thorough analysis of its current situation, considering the optimization and efficient use of the current Port infrastructure, and the review of the relation of the port with its adjacent urban environment, as well as the possibilities of its Port market and business environment. *This expansion intends to maintain the image and functions of the port, which mission, for the next twenty* five years at least, is to offer efficient services to Mexican external trade.

7.2.2. Soil Use and Possession

7.2.2.1. Project Site Property Regime (Regulation)

Regarding the Property Regime of the land that will be occupied by the Project we have:

- The maritime area of the bay, as well as its federal zone, are public property, and therefore, in order to make use of the same, Apiver will require the concession of these areas by SEMARNAT.
- On another hand, the landside areas of dunes that are located adjacent to the bay's federal zone, and are required for the development of the project are private property; therefore Apiver has started the arrangements for their purchase.

7.2.2.2. Current use of the land at the Project site and adjoining areas.

According to the INEGI's Letter of Soil Usage and Vegetation (1:250,000), the terrestrial portion at the west side of the Vergara Bay is classified as Dunes and Forest (potential use). Currently, the Vergara Bay has the following activities (current use):

Fishing.- *Mainly octopus and scale in the low reefs. There is a small community of fishermen settled down* along the west portion of the bay.

Recreational.- Several recreational activities are carried out mainly in the south area of the bay known as Playa Norte and Playa Linda; however these activities are on land and occasional (beach sports, sun sports, picnics) and are carried out by locals. No aquatic activities are held and tourism has not been promoted in this zone, since the Urban origin - waste water treatment plant discharges in this zone (CRAS)

Adjacent to the bay beaches there is a community of casuarinas (beef wood) that serves as a physical barrier against the north winds towards the urban area. This community presents its greater abundance and coverage in the south portion of the bay and becomes scarce towards the northwest portion, where the organisms are scarce. No forest use is made in this area.

Behind the casuarinas there is a wide dune zone with a discontinued vegetarian coverage, which provides the mobile characteristic to some of them. These lands have a farming use, although the are currently abandoned, and show some signs of vegetation.

7.2.2.3 Urbanization of the Area.

In the area where the Project will be established there is no urbanization, with the exception of the roadway for the access to the beach zones from the Highway to Cardel. However, its closeness to the urban area of the City of Veracruz and the Port itself, implies being close to the public services distribution network, such as electric power, drinking water, and sanitary drainage. Therefore the supply of these services to the new site at Vergara Bay would imply expansion of the current infrastructure

without crossing wide regions of land. The type of infrastructure required for this expansion will be determined by the competent authorities in accordance with the projects considered in the corresponding applications.

On another aspect, and adjacent to the Project area, the CRAS urban waste water treatment plant is located, as previously mentioned, that discharges its effluent directly to the bay.

7.2.2.4 Protected Natural Area.

The Vergara Bay is located inside the polygon that involves a Protected Natural Area, under the category of National Park, denominated "Veracruz Reef System", which untie now does not have with a decreed Operation Plan. Within Section 7.3, more detailed information on this park will be provided, now indicating only that the date of the Decree denominating it as Protected Natural Area is dated August 24, 1992.-

7.2.2.5 Other Priority Attention Areas.

Within the terrestrial area located at the west side of the Vergara Bay, there is a dunes' system that is comprised within the priority land region 123, denominated by the CONABIO as Central Veracruz Coast Dunes, and constituting a wide polygon that covers from the surroundings of the Chachalacas Beach up to the City of Veracruz.

As for the maritime portion, Vergara Bay is located in the priority maritime region 49, that comprises ecological systems such as the reefs, and denominated by the CONABIO as Antón Lizardo – Laguna Verde (Green Lagoon), and which polygon covers reference points to the lagoon and location after which it was named.

7.2.3 Historical analysis of the traditional use of the soil and/or water and natural resources of the zone.

Within the area where the Project will be developed we have the convergence of the terrestrial and maritime areas, therefore the analysis will include both systems.

Regarding Vergara Bay, it has traditionally been used mainly for fishing activities. The current installations are of the cabin type, and the vessels are mainly launch boat type.

As a secondary use, several activities related with the tourism sector have been carried on, mainly the exploitation of reef species as handicrafts.

The use of the bay beaches for swimming has not been very popular, mainly because the urban waste water treatment plant discharges into the bay water.

In this manner, the anthropogenic activity has resulted in a deterioration of the natural resources of the due to the contamination of its water and the deterioration of its ecological system, mainly at the low reefs.

As related with the land portion, the south portion of the bay has been subject to the pressure of the city growth and the Port activity, with gradual urbanization.

The roadway to Cardel can be established as the element that fragmented the natural, vegetal community since the beginning. Starting as of this fragmentation; greater urbanization can be observed in the lands located at the south of this road:

On its part, the north portion of the roadway has also been partially urbanized, and some housing and equipment uses can be found.

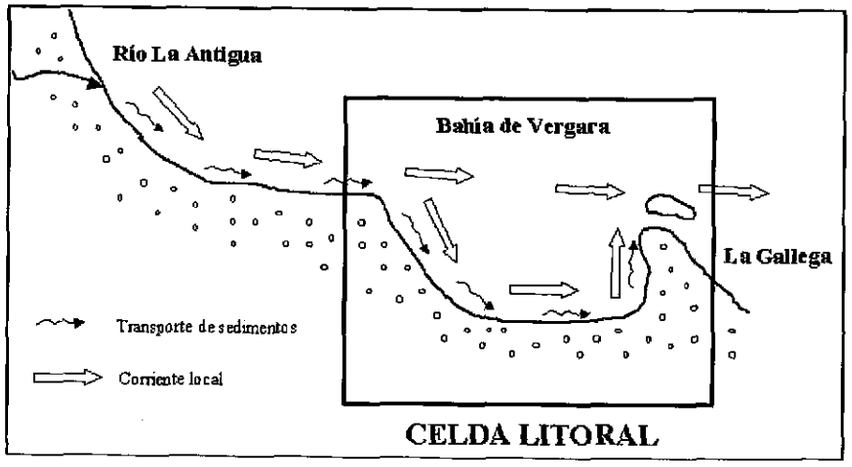
In this manner, the anthropogenic activity has resulted in deterioration of the natural continental resources by deforestation and contamination of water and soil.

7.3 Description of the environmental system

7.3.1 Delimitation of the Study Area.

With the purpose of delimitation of the Study Area in order to perform the analysis of the environmental system, and to determine the development trends and the environmental deterioration of the region, the concept of "Littoral Cells" proposed by the US Army Corps of Engineers was taken as the main criteria. (USACE, 1992).

By applying this principle in the zone, a littoral cell can be defined between the Río La Antigua discharge (sediment source) and the physical barrier imposed by the presence of the La Gallega and La Galleguilla reefs at the east side of the Vergara Bay (sediment discharge). In this way we have that, by applying the principle of conservation, the inlet and outlet of the system are balanced in the Vergara Bay. The entry of sediments takes place at the west side of the bay, in the Punta Gorda area, as a result of the littoral transportation from the La Antigua River, and the discharge takes place at the opposite end of the bay, at the side of the mentioned reef.



The extension of the Study Area towards the sea is imposed by the local superficial current that passes through at the north of the bay, and towards the land at the Veracruz-Cardel roadway, which can be considered as an important physical barrier of the terrestrial environmental system.

(Local superficial current)
Bahía de Vergara
(Roadway to Cardel)

Based on these criteria, the area for the study was established as Vergara Bay, covering adjoining west portion that comprises part of the coastal dunes zone.

The hydrodynamic simulation model elaborated by CFE (Federal Electricity Commission) for the APl-Ver, corroborates the initial hypothesis considered, indicating that in the La Gallega and La Galleguilla reef Areas, the streams that flow out of the Vergara Bay join those ones coming from the Punta Gorda, thus providing a resulting stream oriented towards the east.

7.3.2 Regional Environmental Diagnosis.

With respect to the **physical factors of the natural marine environment**, at a regional level, the discharge of the La Antigua River becomes an important factor to be considered in the case of variations in the quality of the water from the superficial stream, or the amount of sediment carried by the littoral transport inside this subcell.

Within the **physical factors of the natural terrestrial environment** we have the coastal plains constituted by the matter from the water drain and the presence of a dunes system of Aeolian origin, formed by the carriage of alluvial matter that is deposited at the beach.

With respect to the **biotic factors of the natural marine environment**, at a regional level, the conservation of the coral reefs is determined by a series of factors that convert them into a fragile system which is sensitive to natural or anthropogenic-origin environmental variations.

Regarding the **biotic factors of the natural terrestrial environment**, at regional level, the urban growth has maintained high pressure on the environmental system both for the elimination of natural areas, as well as contamination of the environment.

7.3.3 Identification and analysis of the processes of changes in the regional environmental system

With base on the generated environmental diagnostics, the processes of change identified for the Study area can be summarized as follows:

In the case of the processes of the **physical marine environment,** the changes in the quality of water and littoral transport have had their origins in the modifications that its principal contribution source, the La Antigua River, has had through time, representing the main source of increase of the volume of terragenous matter that arrives at the coast, and one of the main sources of marine contamination.

As evidence we find the deterioration of the reef zone located on the west end of the polygon that involves the Veracruzan Reef System, constituted by the Punta Gorda reef.

Not only does the littoral transport flow increases on account of the increase in the contribution of settlements to the system; the volume of suspension matter carried by the local superficial stream also increases.

In the case of the processes of the **terrestrial physical environment**, although the processes that determine the formation of dunes within the area have been maintained, the changes in the volume of littoral transport flow may have increased the amount of matter that enters into the dune zone, Therefore, if the historical urbanization processes that have transformed the dune zone are maintained, the capacity of the system to contain and store the excess of beach matter produced by the littoral flow will be surpassed.

In the case of the **marine biotic environment** processes, among the most important causes of the deterioration of the coral reefs are the variation in the parameters of the water, excessive fishing, and inadequate use of fishing methods.

As for the terrestrial **biotic environment processes**, the deterioration of the vegetation communities located around the Vergara Bay has been historically occasioned by the fragmentation of the ecological systems, when the deforestation required for the expansion of human settlings was increased.

In the case of the socio-economical environment processes, since the foundation of the Port of Veracruz, pressure has been placed on the natural resources, both due to the expansion of human settlments, as

well as the generation of wastes and diversification of the productive activities, with which, the trend to the change in the use of the soil has been accentuated.

7.4 Construction of future scenarios.

7.4.1 Scenario without Project.

Considering the indicated change processes and maintenance of current trends, the scenarios for the short, medium and long range are, from the point of view of the selected indicators for the critical, relevant factors:

In the short term (< 5 years):

The environmental system will be maintained in the current conditions.

In the mid term (6 to 15 years):

The increase in the contribution of sediments of La Antigua River, and the population growth in the Port, will increase the deterioration symptoms in La Gallega and La Galleguilla reefs; therefore mitigation measures should be undertaken.

Given the fact that the creation and maintenance of the dunes is partially determined by the volume of matter in the beach, very low significant advance of the dunes towards the beach is foreseen.

The urban spot will begin to occupy the spaces which are destined for it in the north portion of the city, just as was foreseen in the Regional Urban Development Plan.

In the long term (> 15 years):

The coral reefs could become completely deteriorated due to the excessive levels of sediment, contaminants, and matter.

The increase in the littoral transport flow could break the existing balance, surpassing the accumulation of sediment in Punta Gorda, and with it, to produce blocking at the foot of the Breakwater in the bay and west side of the La Gallega reef.

The increase in the volume of the littoral flow can propitiate an advancement of the dunes towards the sea, the increase of its height and/or the formation of a greater number of moving dunes.

The urban area will begin to completely consume the spaces destined for its growth at the north portion of the city, thus generating social problems and problems in the infrastructure and sanitary drainage network, due to the arrival of sediment.

7.4.2 Identification, description and evaluation of the environmental impacts, accumulative and residual, of the Regional Environmental System.

7.4.2.1 Identification of the effects on the structure and functions of the Regional Environmental System.

7.4.2.2 Construction of the modified scenario for the Project.

In the Vergara Bay, the breakwater will form a space that will comprise a great part of the bay, changing the hydrodynamics to the interior of the same, however the local surface current will be maintained in the area of La Gallega and La Galleguilla reefs, the direction and speed vectors within very similar conditions to the ones they currently present. The interior of the space and the protection generated will favor the relative calm water.

The direction of the net littoral flow will continue to be towards the east, but the breakwater will represent a physical barrier that will propitiate the accumulation of material. As the deposit advances, the depth will increase, with which, the effect of the waves will be lessened and its transportation capacity will be reduced.

The turbidity generated by the discharge of the La Antigua River, will remain present even with the Project in operation, given the bay hydrodynamics, the matter dispersion zone, and the relative dilution will be modified with the creation of the port space, and it is expected, upon the conclusion of the Project, that there will be an increase of suspended solids in the reefs area.

The design of the breakwater will start in the Punta Gorda reef area, which is completely clogged according to the videos, only the building remains, and currently, marine pasture meadows are found, the meadow located in the internal part of the bay will be eliminated by the dredging and filling activities.

In the interior of the space, at the maritime portion, wide areas of fill will be generated that will eliminate the beaches and change the existing bathymetry, and will permanently bury the benthonic communities.

With respect to the landside portion, we have changes on the topography and the communities of soil flora and fauna. The communities that are currently present in the area are stabilized dunes, pasture, casuarinas zones, and beach vegetation. A small fraction of this area is considered by the Regional Urban Development Plan of the north Zone of the city of Veracruz, as *Productive Ecologic Reserve Area*, therefore, the authorization of the corresponding authorities must be previously requested, for the change of the use of this soil to *Port Auxiliary Services*.

Regarding the socio-economic factors, as the first relevant impact during the operation stage, we have an increase in the generation of jobs, with which , the growth of the urban sector at the north of the city is expected.

At the local level, the following aspects must be considered:

The small fishing community settled in the bay will not be able to continue its activity there; therefore, the proprietors must be compensated.

In the case of elimination of land with farming activities located in the dunes' zones that will affect the Project directly, the activities have been practically abandoned, therefore we foresee the sale-purchase of this land.

The recreational activity at the beach is precarious and occasional (some sporting practice, picnics, sun bathing, etc), therefore we do not foresee a significant effect of this activity.

We will now present the transitional scenario, starting from the current conditions and up to the conclusion of the Project at the long range, where most of the expected changes are temporary.

As one of the greater effects, we have the increase of turbidity caused by the construction of the breakwater, dredging and setting of pickets, as these activities might affect the coral reefs; therefore, mitigation measures must be taken in order to maintain these communities.

Secondly, we have other diverse effect that must be taken into account for the construction process of the Project, with the objective of making the process environmentally feasible.

7.4.3 Techniques to evaluate the environmental impacts.

The method which was used for the identification and evaluation of the environmental impacts generated as a consequence of the implementation of the Project was the following:

Several lists were used, which were afterwards co-related by means of an "Environmental Impacts Matrix", with the purpose to perform a preliminary identification of impacts. In this manner, environmental factors and project activities that did not have an interaction were eliminated, thus obtaining a Leopold reduced matrix; the method used for filling this matrix is the one known as "Delphi".

The method used for the screening and further filling of the Matrix, was the one known as "Delphi".

The screening of the matrix is shown in the **Environmental Impacts Matrix I (Table 7-1 to 7-4)** The interaction squares were consecutively numbered in order to have an identification number for each impact.

A qualitative evaluation of the impacts was performed afterwards.

7.4.4 Evaluation of the Environmental Impacts.

Considering the global analysis of the environmental impacts, we have that out of a total of 149 impacts, and making 14 groups in 10 environmental factors, we obtained a total of 100 impacts. Out of those, 86 were classified as being of adverse nature for the environment, and the remaining 14, of a beneficial one.

Table 7-1 – ENVIRONMENTAL IMPACTS MATRIX I (IMPACTS IDENTIFICATION)

PROJECT				Project activities																						
"Expansion for the Port of Veracruz in the Vergara Bay"				Site selection and preparation									Construction										Operation and maintenance		
B-Significant benefic impact b-Low significant benefic Impact A-Significant adverse impact a-Low significant adverse impact I-Mitigable impact t-Temporary impact				Site selection	Petrous material dock	Roadway preparing	Fabrication area of the elements of breakwater	Workshop area and dredging storage	Cleaning area/machinery maintenance	Equipment and machinery operation	Handling of wastes		Transportation of materials	Petrous material storage	General material storage (*3)	Construction of prefabricated elements	Breakwater construction	Dredging	Embankment construction (retaining wall)	Fillings	Equipment and machinery operation (includes dredger)	Handling of wastes		Maritime traffic	Works maintenance (breakwater/dredging)	
Physical - chemical	Rain water	Water flowing (quality)									52				76							124				
		Alteration of the flow		1																						
	Underground wa	Quality									53				77							125				
	Sea water	Quality			17					46	54				78	82	89	99	106		117	126			139	
	Soil (littoral sediment)	Current use of the beach (recreational)		2																						
		Quality					31		40	46	55		63		79	83					118	127				
		Current use of the bay (fishing)		3																						
	Soil (dunes)	Topography		4																						
		Current use		5																						
	Atmosphere	Odor									56											128				
		Noise			18	25	32	36	41	47			64	70		84	90				119				140	
		Quality				26				48			65	71		85	91				120				141	
Biological	Flora	Marine vegetation			19						57				80		92	100	106	112		129			142	
		Terrestrial vegetation		6							58											130				
	Fauna	Marine fauna			20						59				81		93	101	107	113		131			143	
		Terrestrial fauna		7	21	27	33	37	42	49	60		66	72		86	94				121	132				
		Harmful fauna									61			73								133				
	Marine habitat																			114						
	CONABIO (Priority terrestrial area)			8																						
	Veracruz Reef system	Coral			22												95	102	108			134			144	
		Habitats															96	103	109							
		Decree		9																						
		Risk																					138			
AESTHETIC		Landscape		10																					145	
Socio-economic		Regional Economy		11	23	28	34	38	43						87	97		110	115		135				146	
		Employment and manpower		12	24	29	35	39	44	50			67	74		88	98	104	111	116	122	136			147	
		Public health									62			75								137				
		Risk								51											123				148	
		Urban infraestructure		13									68													
		Port infraestructure																							149	
		Quality and lifestyle				30							69													
		Wind incidence		14																						
		Territorials reserves (*1)		15																						
		Human settlings (*2)		16																						

Table 7-2 - ENVIRONMENTAL IMPACTS MATRIX II (IMPACTS ASSESSMENT)

PROJECT: "Expansion for the Port of Veracruz in the Vergara Bay"

B-Significant benefic impact b-Low significant benefic impact A-Significant adverse impact a-Low significant adverse impact I-Mitigable impact t-Temporary impact

			Project activities																						
			Site selection and preparation									Construction											Operation and maintenance		
			Site selection	Petrous material dock	Roadway preparing	Fabrication area of the elements of breakwater	Workshop area and dredging storage	Cleaning area/machinery maintenance	Equipment and machinery operation	Handling of wastes		Transportation of materials	Petrous material storage	General material storage (*3)	Construction of prefabricated elements	Breakwater construction	Dredging	Embankment construction (retaining wall)	Fillings	Equipment and machinery operation (includes dredger)	Handling of wastes		Maritime traffic	Works maintenance (breakwater/dredging)	
Physical - chemical	Rain water	Water flowing (quality)								atl				atl							atl				
		Alteration of the flow	al																						
	Underground wa	Quality								atl				atl							atl				
	Sea water	Quality		atl					atl	atl				atl	atl	at	atl	at		atl	atl			atl	
	Soil (littoral sediment)	Current use of the beach (recreational)	a																						
		Quality				a		a	atl	atl		atl		atl	atl					atl	atl				
		Current use of the bay (fishing)	b																						
	Soil (dunes)	Topography	Al																						
		Current use	a																						
	Atmosphere	Odor								atl											atl				
		Noise		at	at	at	at	at	at			at	at		at	at				at				at	
		Quality			at				atl			at	at		atl	at				atl				at	
Biological	Flora	Marine vegetation		atl						atl				atl		at	atl	at	Al		atl			atl	
		Terrestrial vegetation	al							atl											atl				
	Fauna	Marine fauna		atl						atl				atl		at	atl	at	a		atl			atl	
		Terrestrial fauna	al	at	at	at	at	at	at	atl		at	at		at	at				at	atl				
		Harmful fauna								atl			atl								atl				
	Marine habitat																		a						
	CONABIO (Priority terrestrial area)		al																						
	Veracruz Reef system	Coral		atl												Atl	Atl	atl			atl			Atl	
		Habitats														Bt	Atl								
		Decree	al																						
		Risk																					Al		
AESTHETIC		Landscape	al																					at	
Socio-economic		Regional Economy	B	bt	bt	bt	bt	bt							bt	bt		bt	bt		bt			bt	
		Employment and manpower	B	bt	bt	bt	bt	bt	bt			bt	bt		bt	bt	bt	bt	bt	bt	bt			bt	
		Public health								atl			atl								atl				
		Risk							Atl											Atl				Atl	
		Urban infraestructure	B									atl													
		Port infraestructure																						B	
		Quality and lifestyle			atl							atl													
		Wind incidence	al																						
		Territorials reserves (*1)	al																						
		Human settlings (*2)	a																						

*1-Regional Urban Development Plan, *2-Arrival, *3-Dredger, retaining walls and protection elements

Table 7-3 - ENVIRONMENTAL IMPACTS MATRIX III (IMPACTS ASSESSMENT WITH MITIGATION MEASURES)

PROJECT			Project activities																						
"Expansion for the Port of Veracruz in the Vergara Bay"			Site selection and preparation									Construction											Operation and maintenance		
B-Significant benefic impact b-Low significant benefic impact A-Significant adverse impact a-Low significant adverse impact I-Mitigable impact t-Temporary impact			Site selection	Petrous material dock	Roadway preparing	Fabrication area of the elements of breakwater	Workshop area and dredging storage	Cleaning area/machinery maintenance	Equipment and machinery operation	Handling of wastes		Transportation of materials	Petrous material storage	General material storage (*3)	Construction of prefabricated elements	Breakwater construction	Dredging	Embankment construction (retaining wall)	Fillings	Equipment and machinery operation (includes dredger)	Handling of wastes		Maritime traffic	Works maintenance (breakwater/dredging)	
Physical - chemical	Rain water	Water flowing (quality)																							
		Alteration of the flow																							
	Underground wa	Quality																							
	Sea water	Quality															at							at	
	Soil (littoral sediment)	Current use of the beach (recreational)																							
		Quality																							
		Current use of the bay (fishing)	b																						
	Soil (dunes)	Topography	a																						
		Current use																							
	Atmosphere	Odor																							
		Noise																							
		Quality																							
Biological	Flora	Marine vegetation																	a						
		Terrestrial vegetation	a																						
	Fauna	Marine fauna																							
		Terrestrial fauna	a																						
		Harmful fauna																							
	Marine habitat																								
	CONABIO (Priority terrestrial area)																								
	Veracruz Reef system	Coral															at							at	
		Habitats														BI	at								
		Decree																							
		Risk																					a		
AESTHETIC		Landscape																							
Socio-economic		Regional Economy	B			bt									bt						bt			bt	
		Employment and manpower	B			bt												bt			bt			bt	
		Public health																							
		Risk																							
		Urban infraestructure	B																						
		Port infraestructure																						B	
		Quality and lifestyle																							
		Wind incidence	a																						
		Territorials reserves (*1)																							
		Human settlings (*2)																							

*1-Regional Urban Development Plan, *2-Arrival, *3-Dredger, retaining walls and protection elements

Table 7-4 - ENVIRONMENTAL IMPACTS SUMARY

Impacts	Nature		Importance		Temporary		Mitigable	
100	Benefic	14	B	5		5	B	4
							B/	1
					t	0	Bt	0
							Bt/	0
			b	9		1	b	1
							b/	0
					t	8	bt	8
							bt/	0
	Adverse	86	A	8		2	A	0
							A/	2
					t	6	At	0
							At/	6
			a	78		15	a	7
							a/	8
					t	63	at	9
							at/	54

Out of the 86 environmental impacts with an adverse nature, 78 had a non-significant importance, out of those, 63 were considered as temporary, and 54, as susceptible for mitigation. It is relevant to observe the fact that out of these impacts, only 5 are considering as having a residual impact at the application of the pertinent mitigation measures. Enough it is to say that both in the Site Preparation stage, as well as the Construction stage, the activity for the handling of wastes contributed with 11 environmental impacts under this characteristic, making a total for both stages of 22 impacts which are susceptible for prevention.

Within this general analysis it must also be observed that, by performing an individual analysis of the environmental factors, a great number of not significant adverse impacts are referred to the contamination of the soil, air and water resources (a total of 30 impacts), being most of them (28) susceptible for mitigation and therefore to be prevented with the adequate measures, up to the point of being able to consider their effect as insignificant, with the exception of the quality of the sea water as related with the generated turbidity, where the impact is considered as partially mitigable, and therefore, that it will have a residual effect.

The other big group of environmental factors that concentrates a great amount of environmental factors generated by the Project, is the one concerning both maritime as well as terrestrial flora and fauna (including the coral communities). These 4 factors make a total of 21 environmental impacts, all of them subject for mitigation, with the exception of the marine flora and fauna as related with the turbidity, since it is only partially mitigable.

7.5 Strategies for the prevention and mitigation of environmental impacts.

The mitigation measures are presented as follows, in groups per generating activity:

- ***Site Preparation and Construction Stages.***

Transportation of Materials (TM)

In order to avoid the suspension of dust and accidental spills during the transportation of materials, the suppliers will be requested to cover their trucks with canvas, to avoid traffic jams and noise, the transportation will be programmed at those hours of the day with less traffic, and the nearest suppliers will be contacted.

If due to heavy truck traffic the roads become damaged, these must be repaired.

For the transportation through the beach, the gravel road will be used in order to establish one route only and avoid affectations out of the road.

Handing and Storage of Fuels (MAC).

For the temporary storage of fuels, the current regulations of the Communications and Transportation Secretariat (SCT) must be observed, and pertinent safety measures will be taken to control any incident or accidental spilling.

Storage of Materials (AM).

The materials and minor equipment warehouses must have a roof and be installed on concrete in order to avoid contamination.

Equipment and Machinery Maintenance Program (OME)

The contractors will be requested to use recent, up to date technology equipment with the objective of avoiding failures, low efficiency and environmental contamination.

The contractor must carry a Preventive and Corrective Maintenance log for each unit.

A special area will be conditioned for the installation of a platform constructed of waterproof material, which will be under a roof, to perform the temporary maintenance that allows to safeguard and maintain heavy machinery, and to avoid fuel and oil spills infiltration into the subsoil.
The handling of wastewater and spilling will be hired through a contract with a company specialized in handling this type of residuals.

Handling of Solid and Liquid Wastes (MRSL)

Solid Waste

This solid waste will be generated during all the construction stages, and are constituted basically by plastic and paper bags, empty cans, paper, diverse containers, etc.

For the handling of these wastes, 200-lt containers will be installed, outdoor resistant and with hermetic lids, considering one of these containers for every 25 workers. Emptying of these containers will be performed at least every two days, transporting the containers in pick-up trucks up to other containers that will be installed at the access road to the beach, from where the municipal cleaning services will transport them to the corresponding final disposal sites.

Rock Material

These wastes will be generated during the construction of the breakwater. This material will be temporarily stored in the beach, to be later on used in the fillings to be made.

Marine bottom sediment

These wastes will be disposed of in the Port reserve area, to be used later on as fill material for leveling dunes.

Gravel

This material will be temporarily stored at the site of generation, to be later transported to the site determined by the municipal authority.

Maintenance Waste

The handling and final disposal will be made through companies specialized in the handling of this type of waste, and further treatment at the job site is not considered.

Other wastes such as pieces of pipe, empty containers, rods, spare parts, tow cloth, and other similar wastes will be temporarily stored at the generation site, and later on, specialized companies will be hired for final disposal

Dredger Waste

The dredging personnel will not be able to deposit any wastes that might contaminate the seawater. These wastes will be stored in the dredger and later on will be handled with the rest of the wastes from the works.

Hydrosanitary Wastes

These wastes will be handled through hiring portable latrine services, considering to hire one latrine per each 25 workers.

Tree clearing wastes

These wastes must be cut and arranged in groups that can be transported by material trucks to the sites assigned by the authorities for the purpose, and it is forbidden to burn them.

Residuals from the operation stage.

During the operation stage, the residuals will be handled in accordance with the Partial Cession of Rights' Contracts that the Apiver will celebrate with private companies, and with the Port Operation Regulations to be issued.

Provisional Works Dismantling

All temporary works must be dismantled, and the area completely cleaned.

Workers' Safety (ST)

A Workers' Training and Protection Program will be implemented, and the supply and use of safety equipment will be mandatory.

A First Aid Kit will be available, and several workers will be trained to take care of medical emergencies. The workers must be affiliated to Public Social Security services (IMSS).

Construction of Protection Elements (FCL)

The platform to be used for the construction of protection elements for the breakwater will have perimeter contention dikes to prevent the contamination of sediments from the beach and/or the water.

In the case of using mechanisms for phase drying of the elements, notice must be given to Apiver and SEMARNAT of the proponed mechanism and the measures taken to prevent or reduce the environmental contamination.

Turbidity Mitigation Program (PMT)

- Dredging Practices

Within the existent technology, to select the one that renders the highest levels of efficiency in the suction of the material, and in the operation itself, in order to reduce suspension of the material and maximize the percentage of suction of the same.

- Activity shutdown

As a safety measure in the case that a significant increase of the turbidity in the reference area occurs, the activities must be temporarily stopped until the turbidity levels return to adequate levels.

In order to determine the reference value, Monthly Monitoring of the Turbidity in the area must be initiated at the soonest possible, in order to establish the level of suspended sediments, both for the rainy as well as dry seasons, and continue with this monitoring during the execution of Works. Additionally, a control station will be established at a distance of 2 km to the northeast from the point where the water break starts, in order to determine if the turbidity is being caused by the works or by the Jamapa River.

In order to estimate the behavior of the turbidity when the north winds occur, the level of turbidity must be monitored daily during the first five days after the event, during the first north wind season and in both seasons.

- Sediment Curtains

As an additional measure, during the execution of the Works, a geotextile sediment curtain can be installed at the west side of the reefs.

Water Quality Monitoring (MCA)

A Monitoring Program must be implemented to determine the influence of the La Antigua River, in order to define responsibilities in the case that a dispute should arise regarding resuspension of the contaminants on account of the dredging activities.

Reef Monitoring Program

The marine Flora and Fauna Monitoring campaigns that have been implemented in the La Galleguilla reef area since 1995 must be continued, and their scope must be expanded to include also the La Gallega reef.

Aesthetic Harmonization

Architectural aspects that are adequate to the environment will be designed.

- Operation Stage

Port Operation Regulation (POP)

A Regulation that develops in detail the guidelines to be considered to prevent the deterioration of the coral reefs inside the System will be developed; this Regulation must be concluded at least one year before the start up of the first operational activities.

Water Quality Monitoring

With the purpose to verify that the quality of water flowing into the Port site is maintained in appropriate conditions for the preservation of ecologic systems, a **Permanent Program** of Semi-Annual Monitoring of Physical-Chemical and Microbiologic parameters must be implemented. The minimum of parameters to be determined will be those one contained in NOM-001-ECOL-1996.

Marine Contamination Prevention Program

In order to prevent the contamination of the sea, the mandatory compliance with the applicable Mexican environmental regulation must be included in the Operation Regulations, as well as the International Agreements and Treaties on the same subject.

Reef Monitoring Program

The Marine Flora & Fauna Semi-Annual Monitoring campaigns must be continued, in order to obtain a Catalog of coral species within the zone.

7.6 Final Scenario (with Project and protection and mitigation measures)

With base on the Mitigation Measures, the effects of these in a future scenario.

The local superficial current will continue flowing towards the east, maintaining direction and speed vectors similar to the current ones within the reef area.

The littoral transportation will continue to be towards the east, with the expected sediment accumulation at the windward face of the waterbreak.

The turbidity generated by the discharge from the La Antigua River will continue to be present, until the execution of an intersectorial program for the adequate handling is implemented.

The volume of contaminants discharged by La Antigua River and those from the Grande and Medio, will be maintained after the Project is concluded.

The La Gallega reef area will maintain such hydrodynamics that allows the preservation of the current coral colonies and associated communities

The colonization of marine pasture over the deposits of matter carried by the littoral transport is foreseen at the windward face of the reef.

A strict regulation of the port activity will maintain adequate levels of water quality, with which the presence of marine flora and fauna will be encouraged.

The clearing and leveling of the dune area will permanently eliminate the vegetation and the storage of sediment, however, the reforestation and stabilization of the dunes will compensate this effect.

The demand of housing spaces will be covered through the development of territorial reserves.

The scarce farming activity that will be affected by the occupation of land is not considered to be significant.

As for the effects to be expected during the construction of Works, we have:

The generation of turbidity cannot be totally avoided; therefore we expect a temporary residual impact.

The contamination of resources, and its implication over flora and fauna, will be in many cases prevented, with which the effects will disappear. The residual impact is considered irrelevant.

7.6.1 Monitoring Program.

The proposed Monitoring Program includes:

- Monitoring of local surface streams
- Follow up the process of littoral transport on the windward side to the water break.
- Follow up to the levels of turbidity and contamination generated by the discharge of La Antigua river.
- Follow up of colonization of the water break.
- Follow up of marine pasture colonization at the side of the water break.
- Follow up of dunes reforestation and stabilization actions.
- Follow up of the casuarinas area preservation.

7.7 Conclusions

The development of the Project for the Expansion of the Port of Veracruz in the Vergara Bay federal area will have great local, regional and national benefits, given the magnitude of the same, since it will allow the country to count with a Port that will be at competitive level within the international line, as it will include state of the art technology for the control of the port operations.

At the national level, the Port of Veracruz is the most important commercial port of the country, however, within the Gulf of Mexico area, the development that the port of Houston has achieved threatens to diminish its importance. In this sense, the expansion of the Port of Veracruz is fundamental in order to position it at the required competitive level.

In this sense, the selection of the Vergara Bay as the best expansion alternative is based in the increase of the capacity of the current port, and not to create an alternate port that, on one hand, generates competition at the national level and displacer the importance of the current port, and on the other, that achieves the port capacity required for the competition at international level.

On another aspect, and derived from the analysis of the main environmental impacts generated by the Project, we have the effects. that within the marine environment, the major potential effects are centered in the construction stage, due to the generation of turbidity, and the possible effects on the coral reefs located at the east side of the bay, while in the operation stage due to the port activity itself as potential source of contamination with effects over the indicated ecological systems.

With respect to the terrestrial area, the main effects correspond to the dismantling and leveling of dunes. Thus, considering an adequate development of the proposed mitigation measures, the Project is considered as environmentally feasible.

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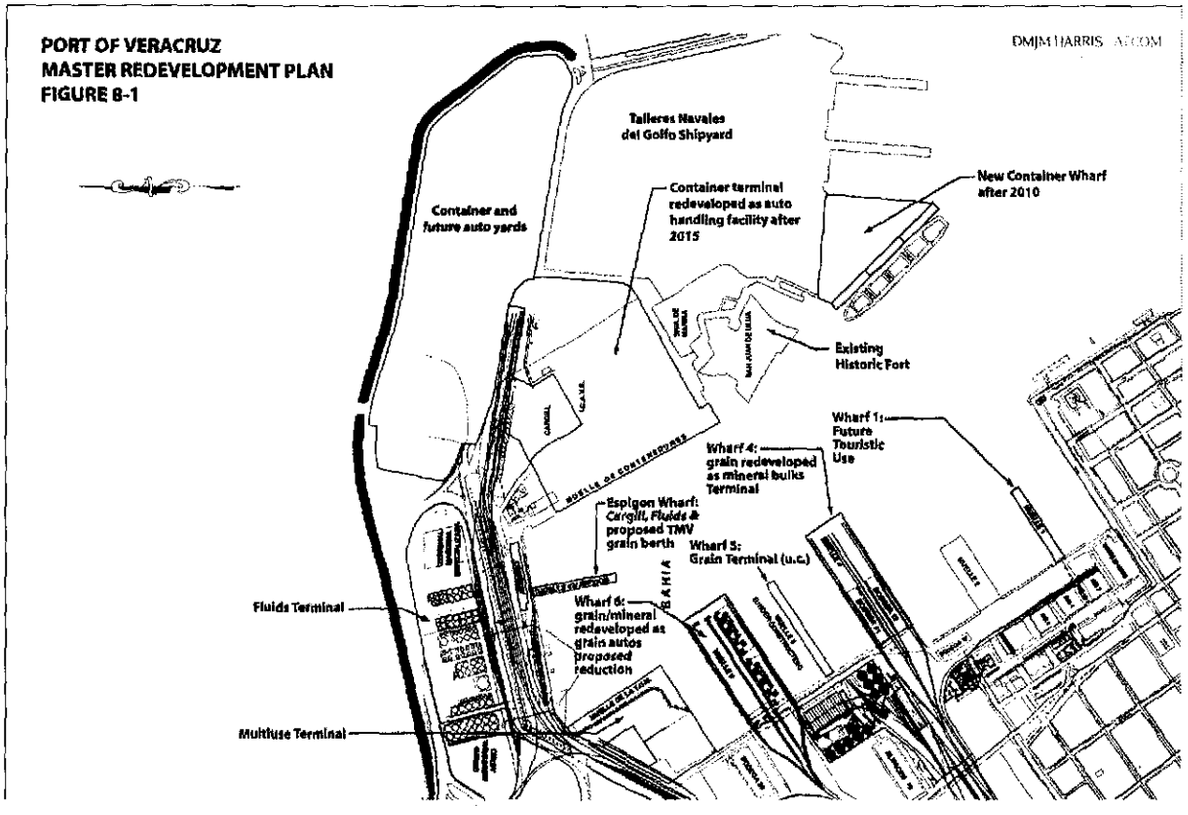
VERACRUZ

8 Review and Update Master Plan for Port Expansion

The Reviewed and Updated Master Plan for Expansion of the Port of Veracruz includes:

Redevelopment of the Existing Port of Veracruz
(See Figure 8-1 below)



Development of additional container capacity at the existing ICAVE terminal, in accordance with demand projections, for the period through 2015, including:

- Marine building,
- maintenance equipment and power,
- gates,
- RTG storage and runway system and reefer capabilities; and
- installation of equipment, including Cranes, RTGs, Empty Handlers, Tractor and Chassis

Development of additional container and general cargo capacity at the exiting CICE terminal for the period through 2010 with additional facilities and handling equipment.

Installation of additional grain handling equipment at Berths 5 and 6 to accommodate demand projections for through 2025, including:

- pneumatic or mechanic unloaders,
- traveling hoppers,
- belt conveyors,
- bulk material storage handling, as described in Section 5.

Installation of additional conveyors or mechanized handling equipment along the espigón wharf, including expansion of the Cargill operation and increased capacity and proposed TMV installation.

Increase in vehicle handling capacity, including redevelopment of CICE and ICAVE terminals after 2010 and 2015, respectively (Figure 8-1).

Installation of handling equipment on Berth 4 for bulk minerals.

Potential development of a new southern container Terminal for post-Panama ships discussed further below.

Improvements included in the Master Plan for Development of the Port of Veracruz, 2000-2010, Modification of February, 2005

1. Urban Boulevard km 13.5 The new road access is to link the port area with the federal highway between Veracruz and Xalapa near Bruno Pagliai Industrial Park. The plan was *published by the Secretariate of Communications of the State in 2000.*
2. Restructuring of Pier 1 – Pier 1 is to be lengthened from 200 m to 220 m, while increasing the depth alongside from 10 m to 12 m, to better accommodate auto carriers. This improvement is scheduled for the period 2004 – 2010.
3. Rehabilitation of Pier 2 – Pier 2 is to be lengthened from 180 m to 200 m, and the maneuvering basin deepened to between 12 m and 14 m, vs. 10 m controlling depths for the pier at present. This improvement is scheduled for the period 2004- 2010.
4. Construction of Wharves in the Present Port - As of 2005, construction has been started on Wharf 5, with a length of 270 m and width of 20 m. The wharf is planned to unload bulk grain carriers on the north face up to 40,000 dwt (195 m length, 29 m breadth and 11.5 m draft) and received Panamax ships up to 65,000 dwt (226 m length, 34 m breadth and 13.1 m draft).
5. Construction of common services in areas of handling personnel contracting, including public transport, fire station, emergency center, food area, sports area, training area and multi-purpose salon.
6. Expansion of the rail network in the port, with a right of way to Santa Fe
7. Electrical, hydraulic and sanitary installations
8. Rehabilitation of administrative areas
9. Construction of installations for refuse
10. Expansion and modernization of Manuel Avila Camacho Boulevard.
11. Restructuring of the interior seawalls
12. Demolition of the old north jetty
13. Pavement in yard 1 in the north of the port area
14. New maritime signalization in the port
15. Bulkheads of San Juan de Ulúa fort.
16. Improvement of the existing roadways, including increase from 3 lanes to 6 lanes of the *entrance north of trailer parking*
17. Center for sea culture for fish
18. Building for access control
19. Narrowing of Berth 6 from present dimensions to maximum length of 270 m and width of 40 m, and to permit greater dredging depths and increase of ship sizes from 40,000 dwt to 65,000 dwt
20. Lengthening of container wharf by 50 m from 507 m to 557 m to receive two ships up to 247 m
21. Lengthening of T wharf for cruise ships, currently 132 m long with a dolphin at 69 m to the South, by extending the wharf deck to the dolphin
22. Construction dredging in the basin, channels and wharves

Currently the port has drafts of 14 m in the access and interior channels and mooring basin, 15 m in the inlet, and 12 to 14 m at the wharf basins, and the official draft of the port for some wharves, such as containers, is 14m.

The basins of the wharves have the following depths:

Basin 1 (between the tourist wharf and Wharf 1)	-10m
Basin 2 (between Wharf 1 and Wharf 2)	-10m
Basin 2 (between Wharf 2 and Wharf 4 south face)	-10.5m
Basin 3 (between Wharf 4 north face and Wharf 6)	-10m
Basin 4 (between ICAVE container wharf and Multi-Use Terminal)	-10m to – 14m

The plan calls for increasing the diameter of the maneuvering basin from 400 to 500 m and increasing drafts in the port to handle larger vessels during the period 2005 to 2010.

23. Development of the zone for logistics activities on 295 ha of land the port acquired in 2003, to provide consolidation / deconsolidation of containers, value-added services, road and rail distribution services and storage services.
24. Lengthening of Multi-Use Terminal wharf by 15m.
25. Reinforcement of Wharf 4 and deepening of the operations basin to 14m, installation of mechanized bulk handling equipment and relocation of Sheds 11 and 12. These improvements are scheduled for the period 2004 to 2010.
26. Construction of building for authorities on the Touristic Wharf.
27. Electrical and hydraulic installations of the Espigón Wharf and Wharf 7 east face.
28. Grade-separated crossing on the Scenic Road to San Juan de Ulúa fort.
29. Construction of a wastewater treatment plant for the Port of Veracruz.
30. Construction of a fire protection network for the Port.
31. Development of a dry port located in the central area of the country.
32. Feasibility studies.
33. Acquisition of land, Customs equipment, IT systems, telecommunications systems and furniture.
34. Maintenance program.

The port's budget for these investments is summarized below:

PROGRAM FOR INVESTMENT IN PORT INFRASTRUCTURE
(USD)

	Total	2003	2004	2005	2006	2007	2008	2009	2010+
1 Urban Boulevard km 13.5	14,442,646	-	2,775,208	7,689,639	3,977,798	-	-	-	-
2 Wharf 1 restructuring	4,407,212	-	2,590,194	1,817,018	-	-	-	-	-
3 Wharf 2 rehabilitation and adjoining seawalls	6,289,547	-	-	-	6,289,547	-	-	-	-
4 Wharf 5 construction	5,494,912	-	3,700,278	1,794,635	-	-	-	-	-
5 Construction of building	2,266,420	-	925,069	-	1,341,351	-	-	-	-
6 Rail improvements	23,259,597	1,394,214	1,387,604	905,828	-	-	-	-	19,571,951
7 Electrical, hydraulic and sanitary installations	2,573,773	430,573	629,047	-	-	589,084	925,069	-	-
8 Administrative areas rehabilitation	2,349,306	1,017,206	1,332,100	-	-	-	-	-	-
9 Waste receiving installations construction	653,654	191,119	462,535	-	-	-	-	-	-
10 Widening of Avila Camacho Blvd	2,405,180	-	2,405,180	-	-	-	-	-	-
11 Restructuring of interior seawalls	6,108,844	513,565	2,405,180	3,190,099	-	-	-	-	-
12 Demolition of old north breakwater	948,751	668,918	279,833	-	-	-	-	-	-
13 Paving in yard 1	1,716,732	754,660	962,072	-	-	-	-	-	-
14 Navigational aids	403,885	135,615	268,270	-	-	-	-	-	-
15 Bulkheads for San Juan de Ulua fort	2,317,068	602,214	1,304,348	-	-	510,508	-	-	-
16 Roadway improvements	4,459,251	470,797	2,372,803	1,615,651	-	-	-	-	-
17 Aquaculture center	573,543	-	-	-	-	573,543	-	-	-
18 Access control building	668,918	-	-	-	-	668,918	-	-	-
19 Narrowing of wharf 8	20,601,295	-	-	4,625,347	15,975,948	-	-	-	-
20 Extension of container wharf	2,035,153	-	-	2,035,153	-	-	-	-	-
21 Extension of T wharf	740,056	-	-	740,056	-	-	-	-	-
22 Dredging in basin, channels and alongside wharves	16,253,469	-	-	5,198,890	5,642,923	5,411,656	-	-	-
23 Development of the Zone for Logistics Activities	64,751,158	-	-	-	-	925,069	8,212,673	5,721,462	51,891,952
24 Extension of the multi-use wharf	462,535	-	-	-	462,535	-	-	-	-
25 Reinforcement of Wharf 4	9,250,694	-	-	-	-	9,250,694	-	-	-
26 Construction of authorities building on tourist wharf	462,535	-	-	-	-	462,535	-	-	-
27 Electrical and hydraulic installations on the espigon wharf	277,521	-	-	-	-	277,521	-	-	-
28 Grade separation on the scenic road to San Juan de Ulua	2,497,687	-	-	-	-	2,497,687	-	-	-
29 Construction of treatment plant	14,081,055	-	-	-	-	7,883,090	6,197,965	-	-
30 Construction of a fire protection network	740,056	-	-	-	-	740,056	-	-	-
31 Development of an inland port	91,951,896	-	-	-	-	-	20,351,526	27,937,095	43,663,275
32 Feasibility studies	5,806,748	1,533,110	832,562	573,358	847,549	693,802	740,056	786,309	-
33 Asset acquisition program	41,660,481	15,383,904	7,826,087	3,568,124	2,312,673	4,523,589	3,700,278	4,347,826	-
	352,891,572	22,896,894	32,458,372	33,751,797	36,650,324	34,987,749	38,127,567	38,792,692	115,127,177

Source: APIVER estimates, converted at rate of 10.81 MXN per USD (June 2005) by consultants

Table 8-1
Investment Schedule for APIVER Master Plan

The bidding program includes:

1. Specialized installation for automotive vehicles, covering 9 ha. This is to be carried out over the period 2004-2005.
2. Cruise ship facilities.

3. Mineral bulks facilities on Berth 4 north face, including 4.3 ha with potential for 20% expansion, handling equipment, with storage for 190,000 tons, and discharge capacity of 15,000 tons per day for scrap, petroleum coke, pig iron, briquettes, fertilizers and others. This is programmed for the period 2004-2005.
4. Bulk grain terminal on Berth 5 north face, and storage development in Playa Linda over 3.4 ha, with storage capacity for 100,000 tons, and a discharge capacity of 15,000 tons per day.
5. Specialized installation for general cargo and steel rolls, including 2.6 ha in the vicinity of Wharf 2. This is scheduled to be developed over the period 2004-2005.
6. Multi-Use Terminal, including exclusive use of Wharf 7 south face and an area of 14.5 ha. This is scheduled for bidding in 2005-2006.
7. Auto facilities are to be developed on Wharf 6 north face.

Bay of Vergara Expansion

Development of northeast breakwater (Figures 8-2 and 8-3).

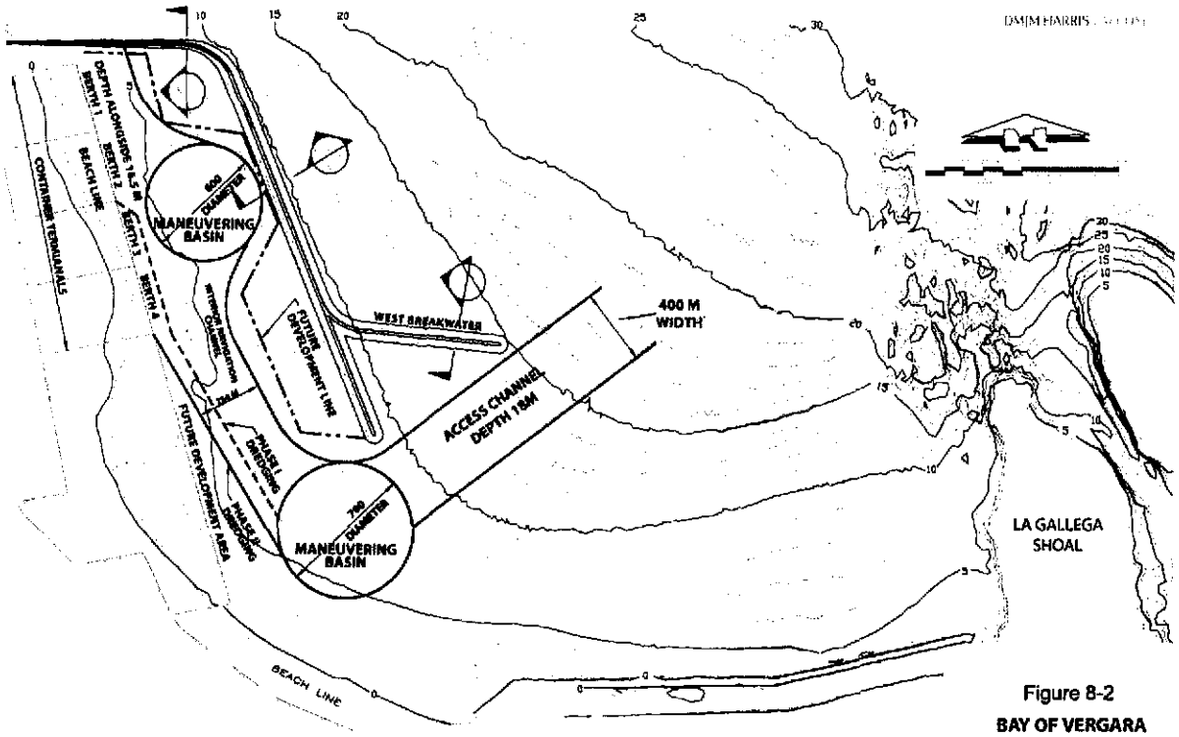
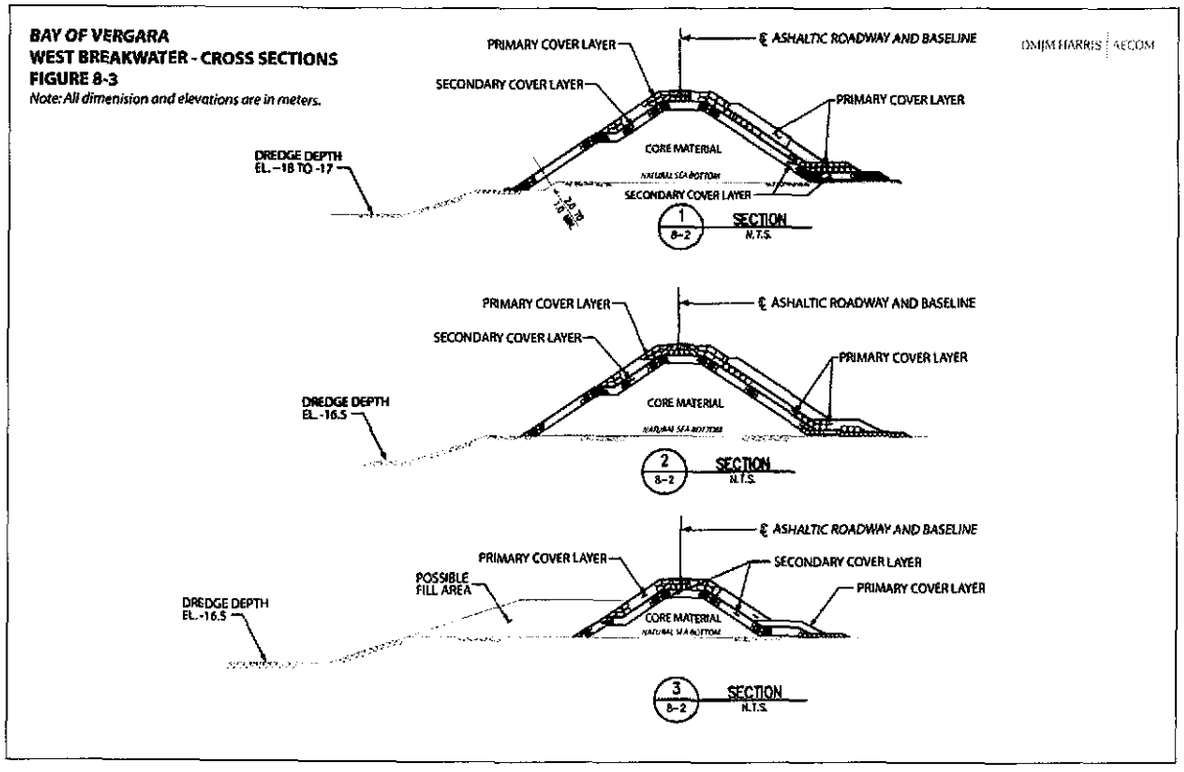


Figure 8-2
BAY OF VERGARA PORT DEVELOPMENT PLAN TO 2025



Development of container terminals including phased development of:

- 1-berth terminal in 2010 (Figure 8-2)
- 2-berth terminal in 2015

Additional terminals in 2020 and 2025 to meet future demand.

Development of Northern and Southern rail access and intermodal yard

Development of road infrastructure and utilities

Linkage to existing Port, Customs, urban infrastructure of Veracruz

Potential future development southwest after 2025.

The redevelopment of the existing port provides capacity to accommodate demand projections for cargo and vessel traffic for grains, minerals, fluids and auto terminals to 2025.

Estimated investments of US$107.8 million in new handling equipment are required to accommodate forecasted grain at facilities in the existing port during the period to 2025.

INVESTMENT COSTS FOR GRAIN HANDLING FACILITIES

Facility	Year	Item	USD Millions
Cargill	2013	1,500 t/h unloader and truck loadout facilitiies	10.4
TMV	2009	Costs borne by concessionaire	
5N	2013	4 x 250 t/h mobile hoppers and conveyors	4.4
5N	2017	3 x 600 t/h unloaders and load out facilities	22.6
5S	2013	4 x 250 t/h mobile hoppers and conveyors	4.4
5S	2020	3 x 600 t/h unloaders and load out facilities	25.4
5S	2025	2 x 500 t/h unloaders and load out facilities	18.7
5S	2025	3 x 500 t/h unlaoders and load out facilities	21.9
		Total	107.8

Estimated investments of $42.4 million in handling equipment are required to enable facilities in the existing port to accommodate forecasted minerals throughput for the probable case to 2025.

INVESTMENT COSTS FOR MINERALS HANDLING FACILITIES

Facility	Year	Item	USD Millions
4N	2009	No improvements	
4N	2016	4 x 250 t/h traveling hoppers, 1,000 t/h dock conveyor	9.2
4N	2025	3 x 600 t/h clamshell unloaders, dock conveyor incr.	24.0
4S	2009	4 x 250 t/h traveling hoppers, 1,000 t/h dock conveyor	9.2
		Total	42.4

The development of the Bay of Vergara site after 2010 provides container capability, and the capability to accommodate of post-Panamax vessels, in addition to the potential for development after 2025 of additional grain handling or other capacity.

The development of the Bay of Vergara is expected to involve dredging costs, estimated at US$115,900,000 plus 10 percent contingency, or $127,490,000 for Phase I, and $11,181,000 plus 10% or $12,299,000 for Phase II (additional berths).

The costs for development of the western breakwater costs are estimated at US$139,633,000. The development of the eastern breakwater would be deferred until after 2025, as the container facilities in Vergara and the dry and liquid bulk and auto facilities inside the existing port would together provide sufficient capacity to accommodate forecasted demand in the probable case up to the time horizon of 2025.

The investment costs in 2010 for a one-berth container terminal at Vergara are estimated at US$101 million. Two additional berths would be required in 2015, at a cost of $181 million.

INVESTMENT COSTS FOR VERGARA CONTAINER TERMINALS

	2010	2015	2020	2021	2025
Civil Works					
Wharf	32,740,380	65,480,760		32,740,380	
Container Yard	16,843,800	33,687,600		16,843,800	
Gate Complex	4,037,400	8,074,800		4,037,400	
Engineering	4,021,619	8,043,237		4,021,619	
Subtotal	57,643,199	115,286,397		57,643,199	
Contingency	5,362,158	10,724,316		5,362,158	
Subtotal facilities	63,005,357	126,010,713		63,005,357	
Equipment	38,590,000	55,940,000	12,950,000		48,230,000
Total	101,595,357	181,950,713	12,950,000	63,005,357	48,230,000

Two alternative scenarios have been considered: one would involve developing the construction of the Vergara container facility in two phases of two berths each. This would allow for economy of effort in building two berths at the same time with the same equipment and mobilization. The capacity would allow the expansion to be smaller and further in the future, providing advantages in terms of the cash-flows of the project. Another alternative would involve building an interim Southern Terminal container facility on a portion of the current site of the Talleres Navales del Golfo (TNG) shipyard during the remaining ten years of the shipyard concession. The Southern Terminal would provide a one-berth post-Panamax facility inside the existing port, making it possible to defer investment in dredging and breakwater at Vergara. (See Figure 8-1)

Discussions were held with the operators of the shipyard, TNG, a unit of McDermott. This alternative *would allow for improved capacity and would allow for the establishment of a one-berth post-Panamax* container terminal inside the existing port.

An additional analysis was performed to address an alternative development scenario. This scenario addresses the possibility of developing a new, dedicated container facility in the near term located on a portion of the property now used by TNG McDermott as a shipyard. TNG has indicated willingness to consider the use of a portion of their concession for this purpose. The timing of container terminal development including this option would include one post-Panamax berth in 2010 with container yards utilizing about 30% of the existing land area of TNG. The development of the Southern Terminal would cost an estimated US$78 million in 2010, as summarized below:

VERACRUZ SOUTHERN CONTAINER TERMINAL

	USD Milions	
	Phase I	*Phase II*
Main wharf structure	24.2	
Wharf outfitting	2.9	
Cellular Cofferdam	13.7	
Upland development	10.4	2.2
Equipment	20.7	18.4
Engineering and Construction management	5.8	0.8
Total	77.8	21.5

PORT OF VERACRUZ
MASTER REDEVELOPMENT PLAN
FIGURE 8-1

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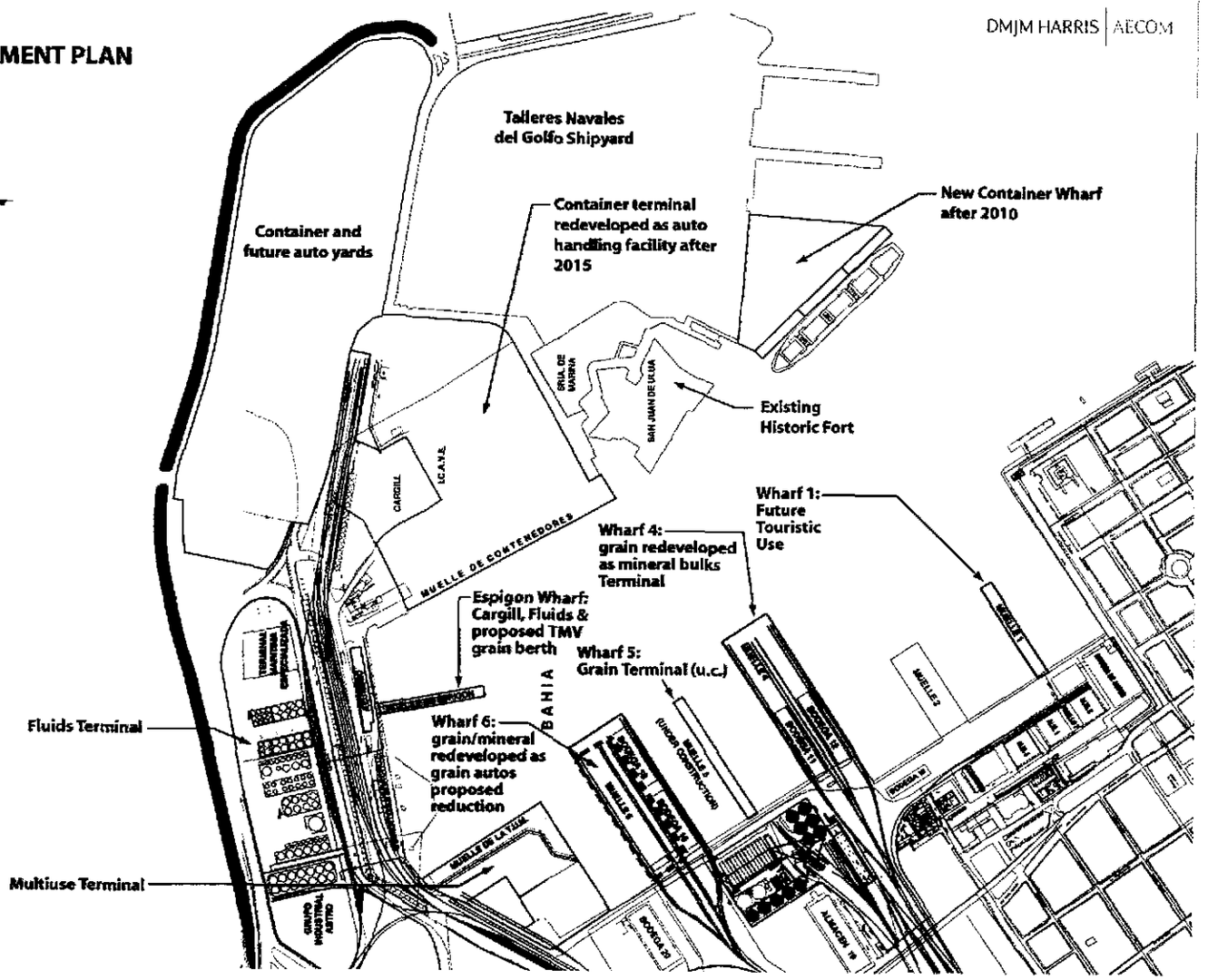

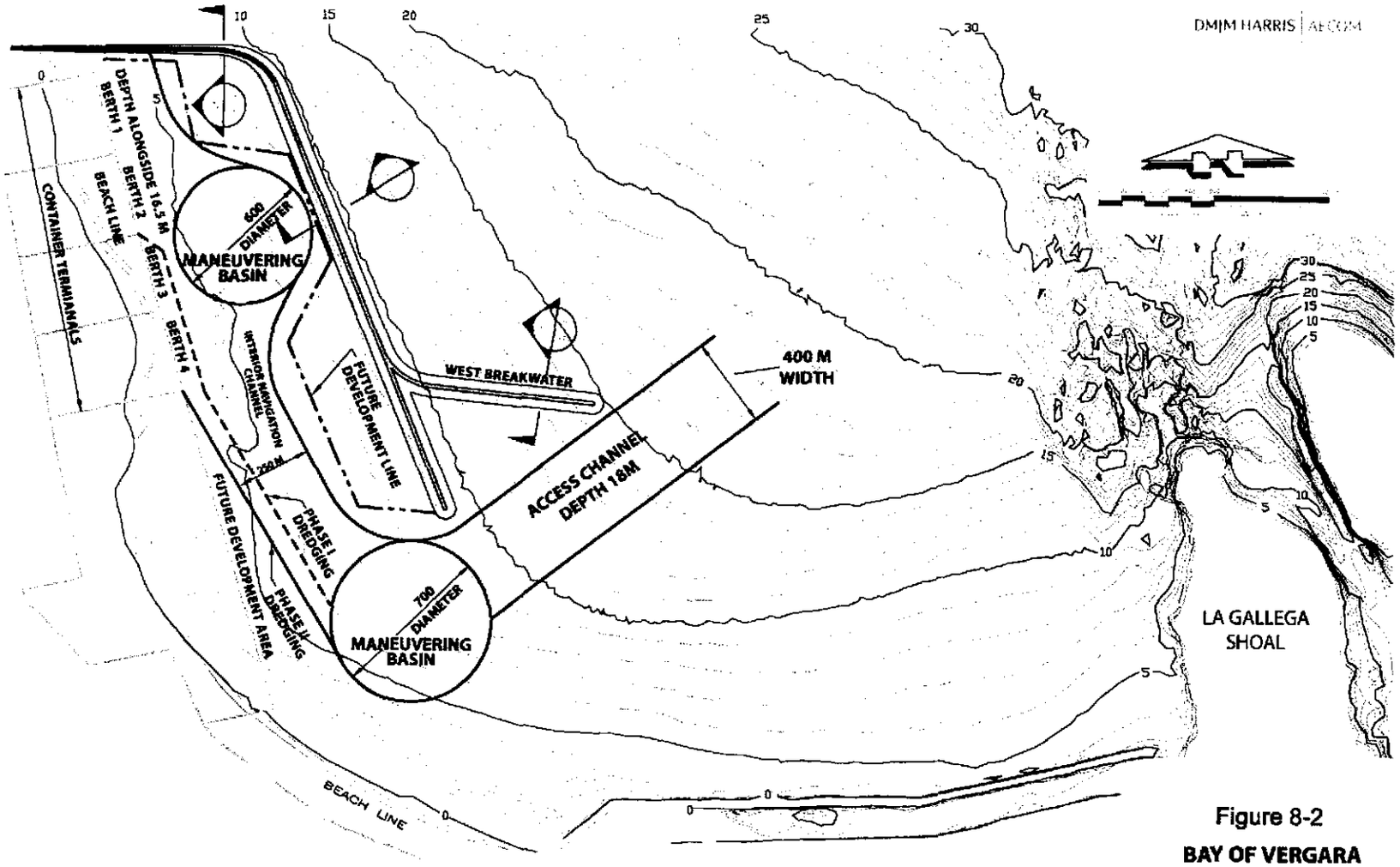

Figure 8-2

BAY OF VERGARA PORT DEVELOPMENT PLAN TO 2025

BAY OF VERGARA
WEST BREAKWATER - CROSS SECTIONS
FIGURE 8-3
Note: All dimenision and elevations are in meters.

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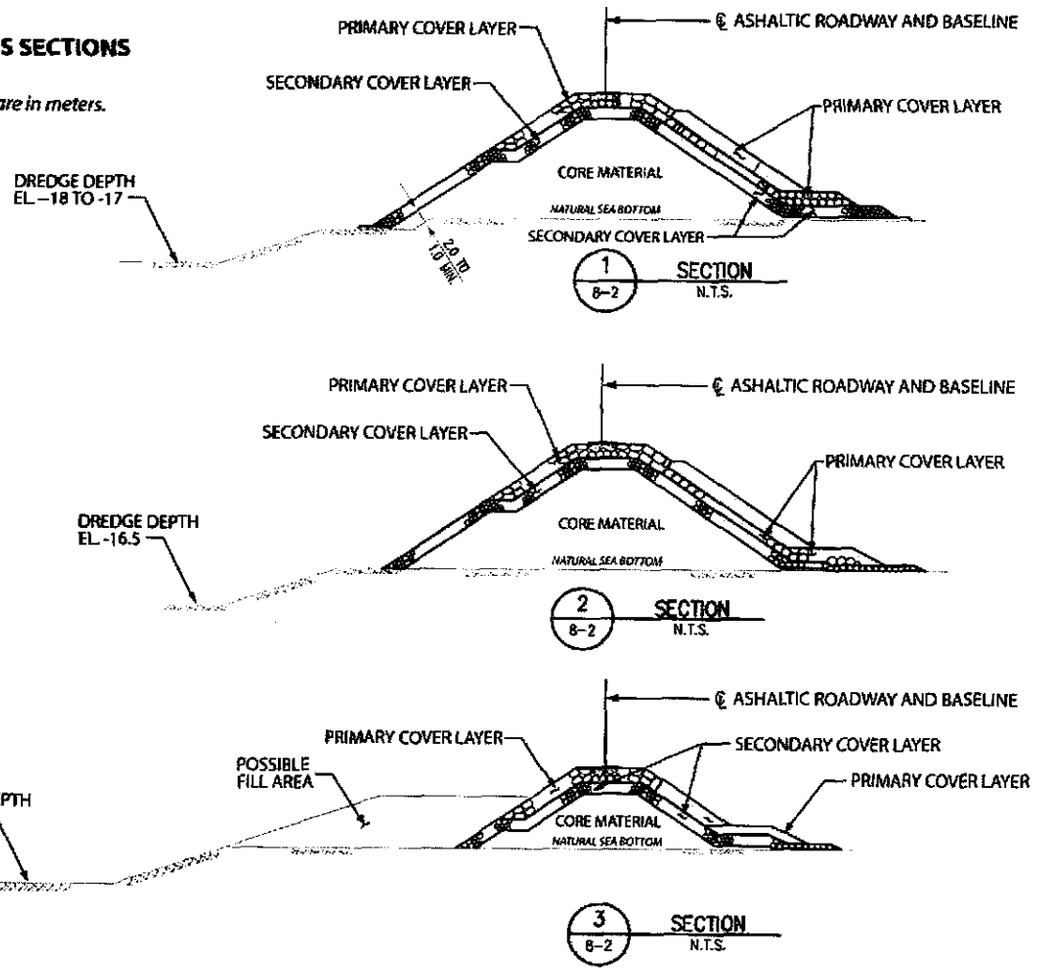

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VERACRUZ

9. Financial / Economic Analysis

This section presents the financial feasibility analysis for the various capital improvement projects proposed in this report.

For each type of cargo, the analysis is performed on the basis of the total cargos and revenues, not on the basis of individual pier or terminal. This is due to the difficulty in evaluating the financial feasibility of a single piece of equipment such as an unloader installed at a pier outside of the context of who will own the improvement and what the competitive situation will be with regard to competing terminal operators or stevedoring companies. By matching up projected cargos with scheduled capital improvements, it is possible to confirm the financial feasibility of the overall investment program. In the case of the grain and minerals terminals, newly improved facilities are assumed to continue to be competing with unimproved facilities, justifying higher tariffs on the basis of higher efficiencies.

The financial models include the following components:

- Schedule of capital investments to meet projected demand;
- Proposed capital and financing costs for the project;
- Proposed tariff and revenues for the project;
- Analysis of debt/asset, debt equity, earnings and debt coverage ratios for the project.

For the container terminals, which are analyzed as stand-alone commercial enterprises, the analysis includes:

- Projected operating costs for the project;
- Pro forma income statement for the project;
- Pro forma balance sheet for the project;
- Pro forma cash flow statement for the project and evaluation of internal rates of return

Analyses were performed on the proposed new facilities for containers, grain handling and non-grain or mineral bulk handling. Bulk liquids were not considered as no new facilities were identified. Likewise automobile facilities were not analyzed as these operations are projected to move to the former container facilities with minimal investment in new infrastructure.

9a Estimated Capital and Financing Costs

Capital Costs for Proposed Container Facilities

The program outlined in this report is for one container berth to be opened at the new Vergara location by 2010 to allow for CICE's operational volume to shift there while meeting increased demand. Two additional berths would allow for the relocation of ICAVE's volume in 2015. An additional berth to be built in 2021 will serve demand forecasts through 2025. Additional container handling equipment would be provided at the existing berths in 2020 and 2025 to increase capacity and meet projected demand.

Two alternative scenarios have been considered. One would include the construction of the Vergara container facility in two phases of two berths each. This would allow for economy of effort in building two berths at the same time with the same equipment and mobilization. The capacity would allow the expansion to be smaller and further in the future, providing advantages in terms of the cash-flows of the project. Another alternative is to delay the Vergara project by building an interim container facility on a portion of the current shipyard site during the remaining ten years of the shipyard concession. Discussions were held with the operators of the shipyard who are open to this possibility. This alternative would allow for improved capacity and would allow for the establishment of a competing container terminal to operate simultaneously with ICAVE. The analysis presented below reflects the one-berth/two-berth/one-berth staging at Vergara as being most consistent with the policy decision to establish Vergara and most consistent with existing concession durations.

The costs of the civil works for the breakwaters, channel and basin at Vergara are not included in the analysis of the container terminals as they are assumed to be covered, at least in part, by federal

participation. However, a brief analysis of the funding feasibility of these works was performed. It assumes a mix of debt and equity. The source of debt repayment would be a rental charge paid by the concessionaire(s) to APIVER and is included in the analysis of the container terminals. Land acquisition or rental costs incurred by APIVER were not included in the development of costs for the new facilities.

CICE Operations
2010: Shift volume currently served by CICE to new terminals at Vergara. One berth, two cranes. Total cost: $102M.

ICAVE Operations
2015: Shift volume currently served by ICAVE to a new terminal at Vergara. Two berths. Total Cost $182M.

Additional Facilities
2020: Additional equipment to meet expected demand. Total cost: $13M.
2021: Additional berth to meet expected demand. Total cost: $63M
2025: Additional equipment to meet expected demand. Total cost: $48M.

Table 9-1
Capital Costs of Vergara Container Terminal - Probable Case

Veracruz - Vergara Container Terminal
Capital Costs: Probable Case
'000 USD

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Facilities Construction																
Phase 1	63,005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 2	-	-	-	-	-	126,011	-	-	-	-	-	-	-	-	-	-
Phase 3	-	-	-	-	-	-	-	-	-	-	-	63,005	-	-	-	-
Subtotal Facilities	63,005	-	-	-	-	126,011	-	-	-	-	-	63,005	-	-	-	-
Equipment	38,590	-	-	-	-	55,940	-	-	-	-	12,950	-	-	-	-	48,230
Initial Working Capital																
Total Capital Cost	101,595	-	-	-	-	181,951	-	-	-	-	12,950	63,005	-	-	-	48,230

The estimated capital costs of the probable case projects are indicated in Table 9-1. The timing and facilities are described in detail earlier in this report.

Table 9-2
Capital Investment and Financing Costs for Vergara Terminal - Probable Case

Veracruz - Vergara Container Terminal
Capital Costs: Probable Case
'000 USD

Capital and Financing	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Capital Cost	101,595	-	-	-	-	181,951	-	-	-	-	12,950	63,005	-	-	-	48,230
Equity Payment	34,364	-	-	-	-	54,585	-	-	-	-	3,885	18,902	-	-	-	14,469
Borrowing	67,232	-	-	-	-	127,365	-	-	-	-	9,065	44,104	-	-	-	33,761
Interest Expense	8,534	8,139	7,697	7,202	6,647	21,310	20,002	18,536	17,606	16,563	18,483	20,360	18,701	17,872	16,944	19,957
Repayment of principal	3,290	3,684	4,126	4,622	5,176	10,903	12,211	7,757	8,688	9,731	11,797	13,825	6,904	7,732	8,680	13,048

Table 9-2 indicates the financing costs and cash flows associated with the capital programs under the Probable Case scenario. The same 30% equity / 70 % debt split is utilized as in the initial analysis for all civil works and equipment purchases.

Container Terminals – Southern Terminal Alternative
An additional analysis was performed to address an alternative development scenario. This scenario addresses the possibility of developing a new, dedicated container facility in the near term located on a portion of the property now used by Talleres Navales del Golfo (TNG), a unit of McDermott, as a shipyard. TNG has indicated willingness to consider the use of a portion of their concession for this purpose. We

are calling this option the "Southern Terminal". The timing of container terminal development including this option would be as follows:

Southern Terminal
2010: Construct a new container facility at the current TNG site. One berth, two cranes. Total cost: $78M.

2015: One additional crane, added equipment and civil improvements to meet additional demand. Total cost: $22M.

ICAVE Operations
2015: Shift volume currently served by ICAVE to a new terminal at Vergara. Two berths. Total Cost $181M.

Additional Facilities
2020: Additional equipment to meet expected demand. Total cost: $13M.
2021: Additional berth at Vergara to meet expected demand. Total cost: $63M
2025: Additional equipment to meet expected demand. Total cost: $48M.

Capital Costs for Proposed Grain Handling Facilities
As described earlier in this report, the proposed facilities assume the construction of a new grain terminal by TMV at the espigon wharf. The capacity of this terminal is assumed in the analysis of demand for new facilities but is not included in facilities evaluated for financial feasibility as they are already in the development stage.

The new Pier 5 is included in this analysis and is assumed to be the principal pier for grain handling. Costs to construct the pier are not included in the analysis but the costs of necessary automation equipment to handle projected loads are addressed. The proposed program of grain-handling improvements is as follows:

Cargill
2013: 1 500 t/h unloader and railroad and truck load-out facilities. 11,000t storage. Total cost $10.4M

TMV Berth (Old alumina pier)
2009: 2 x 500t/h unloaders and railroad and truck load-out facilities. Costs already to be borne by concessionaire.

Berth 5N
2013: 4 x 250 t/h mobile hoppers and conveyors. Total cost $4.4M
2017: 3 x 600 t/h unloaders and railroad and truck load-out facilities. 44,000t storage. Total cost $22.6M

Berth 5S
2013: 4 x 250 t/h mobile hoppers and conveyors. Total cost $4.4M
2020: 3 x 600 t/h unloaders and railroad and truck load-out facilities. 44,000t storage. Total cost $25.4M
2025: 2 x 500 t/h additional unloaders and railroad and truck load-out facilities. 35,000t storage. Total cost $18.7M.

Berth 6S
2025: 3 x 500 t/h unloaders and railroad and truck load-out facilities. 40,000t storage. Total cost $21.9M

Table 9-3
Capital Costs of Grain Improvements - Probable Case

Veracruz - Grains
Capital Costs: Probable Case
'000 USD

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Facilities Construction																	
Upgrade Cargill 1Add1 500t/h Unloader	-	-	-	-	2,390	-	-	-	-	-	-	-	-	-	-	-	-
Initial Upgrade Berth 5N &5S - 4 Mobile Hoppers Ea.	-	-	-	-	2,060	-	-	-	-	-	-	-	-	-	-	-	-
Final Upgrade Berth 5N - 5x600tph Mech Unloaders	-	-	-	-	-	-	-	-	5,060	-	-	-	-	-	-	-	-
Interm. Upgrade Berth 5S - 3x600tph Mech Unloaders	-	-	-	-	-	-	-	-	-	-	-	5,710	-	-	-	-	-
Final Upgrade Berth 5S - 5x600tph Mech Unloaders	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,300
Final Upgrade Berth 6S - 3x500tph Mech Unloaders	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5,100
Equipment	-	-	-	-	14,750	-	-	-	17,540	-	-	19,890	-	-	-	-	31,200
Initial Working Capital	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Capital Cost	-	-	-	-	19,200	-	-	-	22,600	-	-	25,400	-	-	-	-	40,600
Equity Payment	-	-	-	-	5,760	-	-	-	6,780	-	-	7,620	-	-	-	-	12,180
Borrowing	-	-	-	-	13,440	-	-	-	15,820	-	-	17,780	-	-	-	-	28,420

Table 9-4
Capital Investment and Financing Costs for Grain Improvements - Probable Case

Veracruz - Grains
Capital Costs: Probable Case
'000 USD

Capital and Financing	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Capital Cost	-	-	-	-	19,200	-	-	-	22,600	-	-	25,400	-	-	-	-	40,600
Equity Payment	-	-	-	-	5,760	-	-	-	6,780	-	-	7,620	-	-	-	-	12,180
Borrowing	-	-	-	-	13,440	-	-	-	15,820	-	-	17,780	-	-	-	-	28,420
Interest Expense	-	-	-	-	1,613	1,485	1,341	1,181	2,899	2,546	2,150	3,841	3,445	3,002	2,218	1,950	6,061
Repayment of principal	-	-	-	-	1,067	1,195	1,338	1,499	2,895	3,243	3,632	3,171	3,552	3,978	2,054	2,300	4,741

Capital Costs for Proposed Mineral Handling Facilities

Berth 4N

2009: Dedicate to mineral shipments – no improvements.
2016: 4 x 250 t/h traveling hoppers, 1,000 t/h dock conveyor. 20,000 t storage. Total Cost $9.2M.
2025: 3 x 600 t/h traveling clamshell unloaders, dock conveyor increased to 2,000 t/h. 40,000 t storage. Total cost: $24M.

Berth 4S

2009: Dedicate to mineral shipments. 4 x 250 t/h traveling hoppers, 1,000 t/h dock conveyor. 15,000 t storage. Total cost $9.2M

Table 9-5
Capital Costs of Mineral Improvements - Probable Case

Veracruz - Minerals
Capital Costs: Probable Case
'000 USD

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Facilities Construction																	
Berth 4S Mobile Hoppers, Conveyor and Storage	2,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Berth 4S Travelling Unloaders, Conveyor and Storage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Berth 4N Mobile Hoppers, Conveyor and Storage	-	-	-	-	-	-	-	2,200	-	-	-	-	-	-	-	-	-
Subtotal Facilities	2,200	-	-	-	-	-	-	2,200	-	-	-	-	-	-	-	-	5,050
Subtotal Facilities	2,200	-	-	-	-	-	-	2,200	-	-	-	-	-	-	-	-	5,050
Equipment	7,000	-	-	-	-	-	-	7,000	-	-	-	-	-	-	-	-	18,950
Initial Working Capital																	
Total Capital Cost	9,200	-	-	-	-	-	-	9,200	-	-	-	-	-	-	-	-	24,000

Table 9-6
Capital Investment and Financing Costs for Mineral Improvements - Probable Case

Veracruz - Minerals
Capital Costs: Probable Case
'000 USD

Capital and Financing	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Capital Cost	9,200	-	-	-	-	-	-	9,200	-	-	-	-	-	-	-	-	24,000
Equity Payment	2,100	-	-	-	-	-	-	2,100	-	-	-	-	-	-	-	-	5,685
Borrowing	7,100	-	-	-	-	-	-	7,100	-	-	-	-	-	-	-	-	18,315
Interest Expense	773	712	644	567	482	386	279	747	683	611	531	441	341	228	102	89	1,667
Repayment of principal	507	568	636	712	798	894	1,001	533	597	669	749	839	939	1,052	104	117	1,446

As above, the financing is based on a 30/70 split between equity and debt financing.

9c Estimated Operating and Maintenance Costs

Operating Costs of the Vergara Container Terminals

Table 9-7
Operating Costs of Bahia Vergara Terminal - Probable Case

Veracruz - Vergara Container Terminal
Operating Costs Forecasts: Probable Forecast
'000 USD

	2010	2015	2020	2025
Direct Operating Costs (Variable)				
Manpower	8,883	23,778	29,080	35,769
Fuel	686	1,657	2,027	2,562
Oil	76	183	223	281
Spare parts	827	1,657	1,879	2,657
Insurance	349	698	752	1,111
Utility costs	262	702	939	1,258
Facilities Rental	16,287	43,542	58,150	77,849
Total Operating Costs	27,369	72,215	93,049	121,486

Table 9-7 summarizes the forecasted operating costs for the proposed Vergara container terminal. Under this case, the direct operating costs are forecasted to increase from US$27 million in 2010 (based on serving one half of the expected total Veracruz container volume at Vergara) to approximately $121 million in 2025. These costs reflect the fixed costs related to operating the new terminals as well as the estimated variable operating costs necessary to handle the projected container traffic. The facilities rental expense is notable as it represents the rental paid to APIVER by the concessionaire for the property occupied by the terminal. This would be a negotiated figure subject to a number of circumstances. In this analysis, a figure of 25% of gross terminal revenues is used. Land acquisition costs for APIVER were not included in the costs to develop or operate the new terminals.

Operating Costs of the Proposed Mineral Facilities

The financial analysis of the proposed minerals facilities was done without estimated operating cost parameters. The analysis is an incremental analysis to determine whether incremental revenues attributable to the facilities would be sufficient to support the financing cost of the infrastructure.

Operating Costs of the Proposed Grain Facilities

The financial analysis of the proposed grain facilities was done without estimated operating cost parameters. The analysis is an incremental analysis to determine whether incremental revenues attributable to the facilities would be sufficient to support the financing cost of the infrastructure.

9d Proposed Tariffs and Revenues

Projected Tariffs - Container

Tariffs are based on existing charges at the CICE and ICAVE terminals as shown in the 2003 tariff schedule for the port. An exchange rate of 11Pesos to 1 US Dollar is used.

Cargo handling, in this analysis, is defined as the total charges for the handling of cargos being loaded or unloaded from vessels. The tariff used is the posted ICAVE combined charges for movement of containers from vessel to pier and from pier to storage yard.

Existing charges for ICAVE were adjusted by roughly 50% to reflect the estimated differences between published tariffs and actualized charges. Also, increased competition would act to lower effective tariffs after the start of operations at Vergara.

Table 9-8
Projected Tariffs of Vergara Terminals - Probable Case

Veracruz - Vergara Container Terminal
Tariff Worksheet
USD

		CICE 2003	ICAVE 2004	Potential Tariff for Veracruz			
				2010	2015	2020	2025
Side Wharfage (Dockage)	per m per hr.	$ 0.57	$ 0.57	0.57	0.57	0.57	0.57
Cargo Handling							
Unloading to Dock (Full or Empty, 20 or 40)	per unit		205.36	-	-	-	-
Movement from Dock to Yard	per unit		197.82	-	-	-	-
Total Cargo Handling Charge	per unit		403.18	200.00	200.00	200.00	200.00
20' Containers, empty	per unit	3.36					
		6.73					
Storage							
20' Containers, loaded *	per unit per day	52.55		25.00	25.00	25.00	25.00
40' Containers, loaded *	per unit per day	74.18		35.00	35.00	35.00	35.00

Projected Tariffs – Grains and Minerals

Accurate information on market tariffs for bulk unloading facilities is very difficult to obtain. Market rates for loading and unloading bulk products are subject to local market conditions including the availability, competitiveness and nature of facilities. Published tariffs are subject to negotiation and discounts. In some cases, there are long-term commitments to a facility with significantly different pricing.

The analysis to establish a feasible tariff for use of the new mineral facilities is based on a sharing of cost savings due to the increased speed of the facilities. This calculation uses a determination of the time savings from faster unloading of the average load multiplied by an estimated daily charter rate for a handy sized vessel calling at the facility. This is conservative as it does not include potential saving due to lowering waiting time for vessels to berth. A portion of these savings are assumed to be available as the basis for an increased infrastructure charge to fund the new facilities. This assumes that the existing infrastructure charge, even at much higher throughputs, would still be available for the upgrade and maintenance of the existing facilities (berths).

Differences in operating costs were not considered as it can be assumed that a facility with a higher degree of capital improvement will be at least as economical to operate as an unmechanized facility whose operating costs are already included in the stevedoring fees.

For grains, the result of the analysis is that passing on 40 percent of the projected cost savings to shippers results in a incremental infrastructure charge of US$0.42 for the period starting in 2009 rising to US$1.16 for 2025.

Table 9-9
Projected Tariffs of Grain Facilities - Probable Case

Veracruz - Grain
Potential Incremental Tariff
USD

Analysis of Potential Incremental Tariff (Infrastructure Charge)

Baseline Charter Rate/day - 30,000 DWT Vessel	$	15,000
Baseline Average Load (tons)		16,000
Tariff Increase as % of Efficiency Improvement		40%

	Wtd Avg. t/day	Avg Berth Time (Days)	Percent Improvement	Savings per Ton	Incremental Tariff
Baseline Existing Capacity t/day (6 berths)	3,446	4.64	0%		
2009 Capacity t/day (7 berths)	4,548	3.52	24%	$ 1.05	$ 0.42
2013 Capacity t/day (4 berths)	5,791	2.76	40%	$ 1.76	$ 0.71
2017 Capacity t/day (5 berths)	7,142	2.24	52%	$ 2.25	$ 0.90
2020 Capacity t/day (5 berths)	8,140	1.97	58%	$ 2.51	$ 1.00
2025 Capacity t/day (5 berths)	10,375	1.54	67%	$ 2.91	$ 1.16

For minerals, the result of the analysis is that passing on 30 percent of the projected cost savings to shippers results in a incremental infrastructure charge of US$0.81 for the period 2009 to 2024 and US$1.09 for 2025.

Table 9-10
Projected Tariffs of Mineral Facilities - Probable Case

Veracruz - Minerals
Potential Incremental Tariff
USD

Analysis of Potential Incremental Tariff (Infrastructure Charge)

(2009 to 2024, 7,600 tons/day divided by 3,216 tons/day baseline rate)		2.36
(2025, weighted average of 17,300 tons/day and 7,600 tons/day)		4.46
Baseline Charter Rate/day - 30,000 DWT Vessel	$	15,000
Baseline Average Load (tons)		16,000
Baseline Time to Unload at 3216 t/day		4.98
Time to Unload at 7600 t/day		2.11
Avg Time to Unload at 2025 Capacity		1.12
Charter Savings per ton Unloaded (2009 to 2024)	$	2.69
Charter Savings per ton Unloaded 2025	$	3.62
Tariff Increase as % of Efficiency Improvement		30%
Incremental Infrastructure Charge 2009-2024	$	0.81
Incremental Infrastructure Charge 2025	$	1.09

Projected Revenues - Container

Revenues are derived from several sources. Chief among them are cargo handling fees for the actual loading and unloading of boxes, dockage fees for allowing ships to tie up to the berth, and storage fees.

Table 9-11
Projected Revenues for Vergara Terminals - Probable Case

Veracruz - Vergara Container Terminal
Income Forecasts: Probable
USD

		2010	2015	2020	2025
Dockage					
Mainline Vessel Berth Hours/Week		157	184	187	230
Feeder Vessel Berth Hours/Week		69	81	53	65
Total Berth meter-hours/week		46,092	54,033	51,992	63,997
Cargo Handling					
Import Containers		442,010	591,088	790,903	1,059,019
Export Containers		431,614	578,211	774,703	1,038,104
Total TEUs		873,624	1,169,299	1,565,606	2,097,123
Total Loaded TEUs		863,228	1,156,422	1,549,406	2,076,208
Total Loaded Boxes		575,485	770,948	1,032,937	1,384,139
20' Loaded		287,743	385,474	516,469	692,069
40' Loaded		287,743	385,474	516,469	692,069
Empties (TEU)		10,396	12,877	16,200	20,915
Empties (Boxes)		6,931	8,585	10,800	13,943
20' Empty		3,465	4,292	5,400	6,972
40' Empty		3,465	4,292	5,400	6,972
Storage					
Average Daily Inventory		22,752	30,451	40,771	54,611
Annual Box-Days		8,304,626	11,114,779	14,881,357	19,933,126
20' Loaded Storage		4,152,313	5,557,390	7,440,679	9,966,563
40' Loaded Storage		4,152,313	5,557,390	7,440,679	9,966,563
Percent of Storage Days Charged	5%				
Income Summary					
Dockage		$ 1,355,277	$ 1,588,772	$ 1,528,761	$ 1,881,734
Wharfage (Loaded)		115,097,067	154,189,600	206,587,467	276,827,733
Wharfage (Empty)		1,386,133	1,716,933	2,160,000	2,788,667
Transhipment		-	-	-	-
Storage (Loaded)		12,456,939	16,672,169	22,322,036	29,899,689
Storage (Empty)		-	-	-	-
Intermodal Transfer		-	-	-	-
Total Income		$ 130,295,416	$ 174,167,474	$ 232,598,263	$ 311,397,823

Table 9-11 describes the projected revenues for the Vergara terminal project by source and type. Revenues for the Probable Case are forecasted to increase from US$130 million in 2010 to $311 million in 2025. It should be noted that this Table represents revenue from the entirety of container traffic to Veracruz. In the financial and feasibility analysis, one half of this revenue is considered available to the Vergara terminals due to the ongoing operations of ICAVE at the old port during this period.

Projected Revenue – Grain Facilities

The revenue to the minerals facilities are based on the projected incremental infrastructure charge calculated above and the projected use of the improved facilities. The analysis of the mineral facilities

indicates a usage of the new facilities ranging from approximately 2.0 million tons in 2009 to approximately 15.6 million tons in 2025. The phasing on the work ensures that the utilization rates for the facilities will be relatively high

Table 9-12
Projected Utilization of New Grain Facilities - Probable Case

Veracruz - Grain
New Facilities Utilization
USD

	2009 (Intermediate)	2010	2011	2012	2013 (First Step)	2014	2015	2016	2017 (Second Step)	2018	2019	2020 (Third Step)	2021	2022	2023	2024	2025 (Fourth Step)
Total Shipments	8,344,734	8,722,367	9,204,333	9,686,299	10,168,264	10,650,230	11,132,196	11,747,320	12,362,444	12,977,568	13,592,692	14,207,816	14,992,888	15,777,959	16,563,031	17,348,102	18,133,174
Capacity Analysis																	
Existing Cargill Capacity	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000
Berths other than Cargill, 6S and 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6S and 5 Existing Capacity (t/yr)	4,500,000	4,500,000	4,500,000	4,500,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	-
Total Existing Capacity	6,100,000	6,100,000	6,100,000	6,100,000	3,400,000	3,400,000	3,400,000	3,400,000	3,400,000	3,400,000	3,400,000	3,400,000	3,400,000	3,400,000	3,400,000	3,400,000	1,600,000
TMV Wharf	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000
Added Capacity due to Cargill Improvements	-	-	-	-	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
Total Capacity w/o New Grain Facility Improvements	2,000,000	2,000,000	2,000,000	2,000,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000
Improved Capacity of Berths 6S and 5	-	-	-	-	*3,600,000*	*3,600,000*	*3,600,000*	*3,600,000*	*5,400,000*	*5,400,000*	*5,400,000*	7,200,000	7,200,000	7,200,000	7,200,000	7,200,000	12,450,000
Total Improved Capacity	2,000,000	2,000,000	2,000,000	2,000,000	6,800,000	6,800,000	6,800,000	6,800,000	8,600,000	8,600,000	8,600,000	10,400,000	10,400,000	10,400,000	10,400,000	10,400,000	15,650,000
Total Grain Handling Capacity	8,100,000	8,100,000	8,100,000	8,100,000	10,200,000	10,200,000	10,200,000	10,200,000	12,000,000	12,000,000	12,000,000	13,600,000	13,600,000	13,600,000	13,600,000	13,600,000	17,250,000
Percent of Capacity New	25%	25%	25%	25%	67%	67%	67%	67%	72%	72%	72%	75%	75%	75%	75%	75%	91%
Utilization of New Facilities																	
Projected Grain Shipments		8,722,367	9,204,333	9,686,299	10,168,264	10,650,230	11,132,196	11,747,320	12,362,444	12,977,568	13,592,692	14,207,816	14,992,888	15,777,959	16,563,031	17,348,102	18,133,174
Newly Allowed (Mech.) Shipments		-	481,966	963,932	1,445,897	1,927,863	2,409,829	3,024,953	3,640,077	4,255,201	4,870,325	5,485,449	6,270,521	7,055,592	7,840,664	8,625,735	9,410,807
Percent of Total	0%	0%	5%	10%	14%	18%	22%	26%	29%	33%	36%	39%	42%	45%	47%	50%	52%
Newly Mechanized Shipments	2,000,000	2,000,000	1,518,034	1,036,068	5,354,103	4,872,137	4,390,171	3,775,047	4,959,923	4,344,799	3,729,675	4,914,551	4,129,479	3,344,408	*2,559,336*	*1,774,265*	*6,239,193*
Total Mechanized Shipments	2,000,000	2,000,000	2,000,000	2,000,000	6,800,000	6,800,000	6,800,000	6,800,000	8,600,000	8,600,000	8,600,000	10,400,000	10,400,000	10,400,000	10,400,000	10,400,000	15,850,000
Mechanized % of Total	24%	23%	22%	21%	67%	64%	61%	58%	70%	66%	63%	73%	69%	66%	63%	60%	86%
Utilization of Mechanized Capacity	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 9-13
Projected Revenue and Incremental Cash Flows for Grain Facilities - Probable Case

Veracruz - Grains
Incremental Revenue and Return Analysis
USD

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Incremental Infrastructure Charge		$ 0.42	$ 0.42	$ 0.42	$ 0.42	$ 0.71	$ 0.71	$ 0.71	$ 0.71	$ 0.90	$ 0.90	$ 0.90	$ 1.00	$ 1.00	$ 1.00	$ 1.00	$ 1.00	$ 1.16
Incremental Revenue, Financeability and IRR																		
Incremental Revenue		843,450	843,450	843,450	843,450	4,794,103	4,794,103	4,794,103	4,794,103	7,748,144	7,748,144	7,748,144	10,441,376	10,441,376	10,441,376	10,441,376	10,441,376	18,197,468
Interest Costs		-	-	-	-	1,612,800	1,484,605	1,341,451	1,180,694	2,699,471	2,546,134	2,150,396	3,840,769	3,445,249	3,002,268	2,217,876	1,950,446	5,061,329
Interest Coverage		*N/A*	*N/A*	*N/A*	*N/A*	*2.97*	*3.23*	*3.57*	*4.06*	*2.87*	*3.04*	*3.60*	*2.72*	*3.03*	*3.48*	*4.71*	*5.35*	*3.60*
Principal Payment		-	-	-	-	1,066,623	1,194,818	1,337,972	1,498,529	2,895,320	3,242,758	3,631,889	3,171,465	3,552,040	3,978,285	2,053,601	2,300,033	4,740,769
Total Debt Service		-	-	-	-	2,679,423	2,679,423	2,679,423	2,679,423	5,794,791	5,788,892	5,782,285	7,012,234	6,997,289	6,980,552	4,271,478	4,250,482	9,802,097
Debt Service Coverage		*N/A*	*N/A*	*N/A*	*N/A*	*1.79*	*1.79*	*1.79*	*1.79*	*1.34*	*1.34*	*1.34*	*1.49*	*1.49*	*1.50*	*2.44*	*2.46*	*1.86*
Incremental Cash Flow		843,450	843,450	843,450	843,450	2,114,680	2,114,680	2,114,680	2,114,680	1,953,353	1,959,252	1,965,859	3,429,142	3,444,087	3,460,825	6,169,899	6,190,895	8,395,370
Equity Payment		-	-	-	-	5,760,000	-	-	-	6,780,000	-	-	7,620,000	-	-	-	-	12,180,000
Net Cash Flow		843,450	843,450	843,450	843,450	(3,645,320)	2,114,680	2,114,680	2,114,680	*(4,826,647)*	*1,959,252*	*1,965,859*	*(4,190,858)*	*3,444,087*	*3,460,825*	*6,169,899*	*6,190,895*	*(3,784,630)*
IRR from 2013 to 2025	32%																	
Cumulative Cash Flows		843,450	1,686,901	2,530,351	3,373,802	(271,518)	1,843,161	3,957,840	6,072,520	1,245,873	3,205,126	5,170,985	980,127	4,424,214	7,885,038	14,054,937	20,245,832	16,461,202

Projected Revenue – Minerals Facilities

The revenue to the minerals facilities is based on the projected incremental infrastructure charge calculated above and the projected use of the improved facilities. The analysis of the mineral facilities indicates a usage of the new facilities ranging from approximately 2.5 million tons in 2009 to 5.4 million tons in 2025. The phasing on the work ensures that the utilization rates for the facilities will be relatively high.

Table 9-14
Projected Utilization of New Minerals Facilities - Probable Case

Veracruz - Minerals
New Facilities Utilization
USD

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total Shipments	2,464,757	2,576,297	2,718,654	2,861,010	3,003,367	3,145,723	3,288,080	3,469,767	3,651,455	3,833,142	4,014,830	4,196,517	4,428,401	4,660,285	4,892,169	5,124,053	5,355,937
Capacity Analysis																	
Old Capacity Net of Berths 6, 7 and 4	461,651	461,651	461,651	461,651	461,651	461,651	461,651	461,651	461,651	461,651	461,651	461,651	461,651	461,651	461,651	461,651	461,651
4N and 4S Capacity (t/yr)	2,475,000	2,475,000	2,475,000	2,475,000	2,475,000	2,475,000	2,475,000	3,480,000	3,480,000	3,480,000	3,480,000	3,480,000	3,480,000	3,480,000	3,480,000	3,480,000	5,640,000
Total Capacity	2,936,651	2,936,651	2,936,651	2,936,651	2,936,651	2,936,651	2,936,651	3,941,651	3,941,651	3,941,651	3,941,651	3,941,651	3,941,651	3,941,651	3,941,651	3,941,651	6,101,651
Percent of Capacity New	84%	84%	84%	84%	84%	84%	84%	88%	88%	88%	88%	88%	88%	88%	88%	88%	92%
Utilization of New Facilities																	
Newly Allowed (Mech.) Shipments		-	142,357	284,713	427,070	569,426	711,783	893,470	1,075,158	1,256,845	1,438,533	1,620,220	1,852,104	2,083,988	2,315,872	2,547,756	2,779,640
Percent of Total	0%	0%	5%	10%	14%	18%	22%	26%	29%	33%	36%	39%	42%	45%	47%	50%	52%
Newly Mechanized Shipments	2,464,757	2,475,000	2,332,643	2,190,287	2,047,930	1,905,574	1,763,217	2,576,297	2,404,842	2,223,155	2,041,467	1,859,780	1,627,896	1,396,012	1,164,128	932,244	2,576,297
Total Mechanized Shipments	2,464,757	2,475,000	2,475,000	2,475,000	2,475,000	2,475,000	2,475,000	3,469,767	3,480,000	3,480,000	3,480,000	3,480,000	3,480,000	3,480,000	3,480,000	3,480,000	5,355,937
Mechanized % of Total	100%	96%	91%	87%	82%	79%	75%	100%	95%	91%	87%	83%	79%	75%	71%	68%	100%
Utilization of Mechanized Capacity	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	95%

The revenue and feasibility analysis for the minerals facilities are as follows:

Table 9-15
Projected Revenue and Incremental Cash Flows for New Minerals Facilities - Probable Case

Veracruz - Minerals
Incremental Revenue and Return Analysis
USD

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Incremental Infrastructure Charge	$ 0.61	$ 0.61	$ 0.61	$ 0.61	$ 0.61	$ 0.61	$ 0.61	$ 0.61	$ 0.61	$ 0.61	$ 0.61	$ 0.61	$ 0.61	$ 0.61	$ 0.61	$ 0.61	$ 1.09
Incremental Revenue, Financeability and IRR																	
Incremental Revenue	1,969,425	1,997,892	1,997,892	1,997,892	1,997,892	1,997,892	1,997,892	2,800,817	2,808,877	2,808,877	2,808,877	2,808,877	2,808,877	2,808,877	2,808,877	2,808,877	5,813,309
Interest Costs	772,000	711,964	643,808	567,481	481,997	386,294	278,003	746,934	682,973	611,347	531,127	441,296	340,852	227,048	101,720	69,158	1,868,948
Interest Coverage	2.57	2.81	3.10	3.52	4.14	5.17	7.18	3.75	4.11	4.59	5.29	6.37	8.25	12.37	27.61	31.49	3.11
Principal Payment	507,050	567,898	636,044	712,369	797,853	893,595	1,000,027	532,927	596,879	668,503	748,723	838,570	939,190	1,051,812	104,454	118,968	1,445,824
Total Debt Service	1,279,050	1,279,862	1,279,852	1,279,850	1,279,850	1,279,850	1,278,850	1,279,850	1,279,850	1,279,850	1,279,850	1,279,866	1,279,850	1,279,850	206,175	208,171	3,112,772
Debt Service Coverage	1.55	1.56	1.56	1.56	1.56	1.56	1.56	2.19	2.19	2.19	2.19	2.19	2.19	2.19	13.62	13.62	1.87
Incremental Cash Flow	109,574	717,842	717,842	717,842	717,842	717,842	717,842	1,520,767	1,529,026	1,529,026	1,529,026	1,529,026	1,529,026	1,529,026	2,602,703	2,602,703	2,700,538
Equity Payment	2,190,900	-	-	-	-	-	-	2,100,000	-	-	-	-	-	-	-	-	5,858,000
Net Cash Flow	(1,380,426)	717,842	717,842	717,842	717,842	717,842	717,842	(579,233)	1,529,026	1,529,026	1,529,026	1,529,026	1,529,026	1,529,026	2,602,703	2,602,703	(2,984,461)
IRR from 2009 to 2025	52%																

9e Pro-Forma Financials and Financial Feasibility

Container Terminals Pro-Forma Financials

A financial model was created to combine projected use of the new terminal with projected capital and operating costs to evaluate the potential returns to investors in the project. This model did not assume a particular financial structure or funding source (outside of a defined debt/equity split to fund improvements). It also simplified schedules to assume a 2009 investment.
Key assumptions in this model included:

- Capital and Operating Costs as well as demand forecasts per the "Probable Case".
- Tariffs 50% of current posted ICAVE rates to reflect discounts and competition.
- 50% of traffic through Vergara during period 2010 to 2015, 100% thereafter.
- 30% Equity, 70% Debt funding.
- Debt funding assumed at a blended interest rate of 12%.
- Dividends paid to equity investors out of excess cash flows. No payments through 2015
- All container traffic through Veracruz subject to facilities rental fee of 25% of gross revenue to fund dredging and protective works at new Vergara location.
- Taxes at 35% rate.

The result of the analysis shows that the proposed project is financially feasible and would provide sufficient returns to attract private equity investors.

Table 9-16
Pro Forma Income Statement for Vergara Terminal Project - Probable Case

Veracruz - Vergara Container Terminal
Income Statement - Probable Case
'000 USD

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Net Revenue	56,479	65,148	69,535	73,922	78,309	82,697	174,167	185,854	197,540	209,228	220,912	232,598	246,358	264,118	279,878	295,638	311,398
Direct Cost	13,329	27,463	29,192	30,921	32,650	34,379	72,215	76,382	80,549	84,716	88,883	93,049	98,737	104,424	110,111	115,799	121,486
Gross Profit	43,149	37,685	40,343	43,001	45,660	48,318	101,952	109,472	116,991	124,510	132,030	139,549	149,621	159,694	169,767	179,839	189,912
Indirect Costs	8,472	9,772	10,430	11,088	11,746	12,404	26,125	27,878	29,631	31,384	33,137	34,890	37,254	39,618	41,982	44,346	46,710
EBITDA	34,678	27,913	29,913	31,913	33,913	35,913	75,827	81,593	87,360	93,126	98,893	104,659	112,368	120,076	127,785	135,493	143,202
EBITDA Margin	61%	43%	43%	43%	43%	43%	44%	44%	44%	45%	45%	45%	45%	45%	46%	46%	46%
Interest Costs	-	8,534	8,139	7,697	7,202	6,647	21,310	20,002	18,538	17,606	16,583	16,483	20,360	18,701	17,872	16,944	19,957
Depreciation	-	3,505	3,505	3,505	3,505	3,505	11,027	11,027	11,027	11,027	11,027	11,675	13,250	13,250	13,250	13,250	15,661
Pre-Tax Profits	34,678	15,874	18,269	20,711	23,207	25,761	43,490	50,585	57,796	64,494	71,303	76,502	78,758	88,126	96,663	105,299	107,584
Taxes	12,137	5,556	6,394	7,249	8,122	9,016	15,221	17,698	20,229	22,573	24,956	26,776	27,565	30,844	33,832	36,855	37,654
Net Income	22,540	10,318	11,875	13,462	15,084	16,745	28,268	32,887	37,568	41,921	46,347	49,726	51,193	57,282	62,831	68,445	69,930
Net Income Margin	40%	16%	17%	18%	19%	20%	16%	18%	19%	20%	21%	21%	21%	22%	22%	23%	22%

Table 9-16 shows the pro forma income statements for the new container terminals under the probable scenarios. The net income is projected to range from US $23 million in 2009 to $70 million in 2025.

Table 9-17
Pro Forma Balance Sheet for Vergara Terminal Project - Probable Case

Veracruz - Vergara Container Terminal
Balance Sheet - Probable Case
'000 USD

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Assets																	
Cash	*10,000*	*14,018*	*25,275*	*37,677*	*51,205*	*65,840*	*85,085*	*52,215*	*58,668*	*43,899*	*42,857*	*40,791*	*42,735*	*61,466*	*43,477*	*42,549*	*38,183*
Net Working Capital	-	6,515	6,953	7,392	7,831	8,270	17,417	18,585	19,754	20,923	22,091	23,260	24,836	26,412	27,988	29,564	31,140
Plant and Equipment																	
Original Cost	-	101,595	101,595	101,595	101,595	101,595	*283,546*	*283,546*	*283,546*	*283,546*	*283,546*	*286,496*	*359,501*	*359,501*	*359,501*	*359,501*	*407,731*
Less: Accumulated Depreciation	-	(3,505)	(7,009)	(10,514)	(14,019)	(17,523)	(28,550)	(39,577)	(50,604)	(61,631)	(72,658)	(84,333)	(97,583)	(110,832)	(124,082)	(137,332)	(152,993)
Book value	-	98,091	94,586	91,081	87,577	84,072	254,996	243,969	232,942	221,915	210,888	212,163	261,919	248,669	235,420	222,170	254,739
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Assets	10,000	118,624	126,814	136,150	146,613	158,182	357,498	314,769	309,364	286,737	275,836	276,214	329,490	336,547	306,884	294,283	324,042
Liabilities																	
Book value of Debt	-	67,827	64,143	60,016	55,395	50,219	166,681	154,470	146,713	138,024	128,293	125,561	155,840	148,936	141,204	132,544	153,259
Equity																	
Original Equity	10,000	44,364	44,364	44,364	44,364	44,364	98,949	98,949	98,949	98,949	98,949	102,834	121,735	121,735	121,735	121,735	136,204
Retained Earnings	-	*10,318*	*22,193*	*33,655*	*50,749*	*67,484*	*95,733*	*85,235*	*67,588*	*53,549*	*52,479*	*51,704*	*55,800*	*69,780*	*47,830*	*43,888*	*38,463*
Total Equity	10,000	54,682	66,557	80,019	95,103	111,848	194,682	184,184	166,536	152,597	151,427	154,537	177,535	191,496	169,565	165,624	174,668
Total Liabilities and Equity	10,000	118,624	126,814	136,150	146,613	158,182	357,498	314,769	309,364	286,737	275,836	276,214	329,490	336,547	306,884	294,283	324,042

Table 9-17 shows the pro-forma balance sheets for the different cases of the cargo terminal expansion project. The balance sheets assume initial equity investments to fund the first phases of the project. Dividends are paid to equity investors over time resulting in fluctuations in the amount of total equity in the project over the project period.

The total assets for the cargo terminal expansion project in 2025 are projected to be $324 million; liabilities are projected to be $153 million and net assets $175 million.

Table 9-18
Pro Forma Cash Flow for Vergara Terminal Project - Probable Case

Veracruz - Vergara Container Terminal
Statement of Cash Flows: Probable Case
'000 USD

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Operating Activities																	
Net Income	-	10,318	11,875	13,462	15,094	16,745	28,268	32,867	37,568	41,921	46,347	49,726	51,193	57,282	62,631	65,445	68,630
Depreciation	-	3,505	3,505	3,505	3,505	3,505	11,027	11,027	11,027	11,027	11,027	11,675	13,250	13,250	13,250	13,250	15,661
Change in Working Capital	-	(6,515)	(439)	(439)	(439)	(439)	(9,147)	(1,169)	(1,169)	(1,169)	(1,169)	(1,169)	(1,576)	(1,576)	(1,576)	(1,576)	(1,576)
Cash Flow from Operating Activities	-	7,308	14,941	16,528	18,150	19,811	30,148	42,725	47,426	51,779	56,205	60,232	62,867	68,955	74,505	80,118	84,015
Financing Activities																	
Increase in Paid in Equity	10,000	34,364	-	-	-	-	54,583	-	-	-	-	3,885	18,902	-	-	-	14,469
Borrowing For Capital Program	-	67,232	-	-	-	-	127,365	-	-	-	-	8,068	44,104	-	-	-	33,761
Repayments of Debt	-	(3,290)	(3,684)	(4,126)	(4,622)	(5,176)	(10,903)	(12,211)	(7,757)	(8,688)	(9,731)	(11,797)	(13,825)	(8,894)	(7,732)	(8,660)	(13,046)
Dividends to Equity investors	-	-	-	-	-	-	-	(83,365)	(35,215)	(55,660)	(47,617)	(52,521)	(47,097)	(43,321)	(84,761)	(72,388)	(75,355)
Cash Flow from Financing Activities	10,000	98,306	(3,684)	(4,126)	(4,622)	(5,176)	171,045	(75,596)	(42,972)	(64,548)	(57,248)	(49,346)	2,084	(50,225)	(92,493)	(81,048)	(40,170)
Investing Activities																	
Capital Expenditures	-	(101,595)	-	-	-	-	(181,951)	-	-	-	-	(12,950)	(63,005)	-	-	-	(48,230)
Cash Flow from Investing Activities	-	(101,595)	-	-	-	-	(181,951)	-	-	-	-	(12,950)	(63,005)	-	-	-	(48,230)
Net Change in Cash Position	*10,007*	*4,018*	*11,256*	*12,402*	*13,528*	*14,635*	*18,248*	*(22,871)*	*4,454*	*(12,769)*	*(1,043)*	*(2,066)*	*1,945*	*18,730*	*(17,988)*	*(928)*	*(4,386)*
Beginning Cash Position	-	10,000	14,018	25,275	37,677	51,205	65,840	85,085	62,215	56,668	43,899	42,857	40,791	42,735	61,466	43,477	42,549
Ending Cash Position	10,000	14,018	25,275	37,677	51,205	65,840	85,085	62,215	56,668	43,899	42,857	40,791	42,735	61,466	43,477	42,549	38,183
17 Year IRR on Equity Calculation (from 2009)	(10,000)	(34,364)	-	-	-	-	(54,583)	83,365	35,215	55,660	47,617	201,153	205,730	234,817	254,326	238,010	235,553
IRR on Initial Equity 34.0%																	

Table 9-18 summarizes the projected cash flows and the analysis of the internal rates of return for the project. The results show the project to be financially feasible based on an internal rate of return of over 34% for the required equity investment.

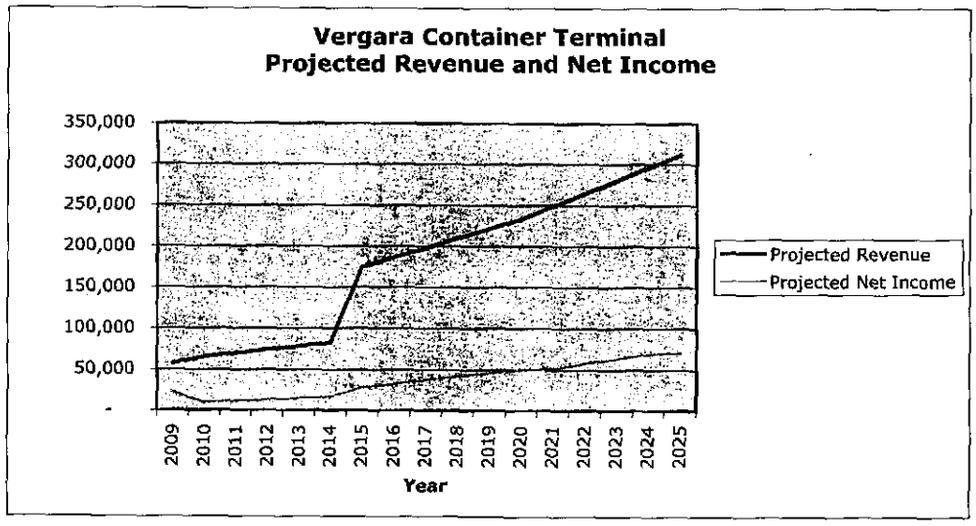
Table 9-19
Pro Forma Cash Flow for Vergara Harbor Works Project - Probable Case

Veracruz - Vergara Harbor Works
Statement of Cash Flows: Probable Case
'000 USD

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Operating Activities																		
Cash Income [Facilities Charge]	0.25	-	32,574	34,767	36,861	39,155	41,346	43,542	46,463	49,386	52,306	55,228	58,150	62,080	66,030	69,959	73,909	77,849
Interest on Harbor Works Debt		(21,465)	(21,028)	(20,534)	(19,983)	(19,368)	(19,492)	(17,901)	(17,035)	(16,064)	(14,977)	(13,758)	(12,395)	(10,868)	(9,157)	(7,241)	(5,095)	(2,602)
Cash Flow from Operating Activities		(21,465)	11,546	14,234	16,878	19,786	21,856	25,640	29,429	33,321	37,330	41,469	45,754	51,222	56,872	62,726	68,814	75,156
Financing Activities																		
Equity Payment		76,660	-	-	-	-	3,354	-	-	-	-	-	-	-	-	-	-	-
Borrowing For Capital Program		178,873	-	-	-	-	7,827	-	-	-	-	-	-	-	-	-	-	-
Repayments of Debt		-	-	-	-	-	(6,731)	(7,539)	(8,443)	(9,458)	(10,591)	(11,862)	(13,286)	(14,880)	(16,665)	(18,665)	(20,905)	(23,414)
Dividends to Equity Investors		-	-	-	(14,234)	(16,978)	(19,786)	(21,856)	-	(29,429)	-	(37,330)	-	(45,754)	-	(56,872)	-	(68,814)
Cash Flow from Financing Activities		255,533	-	-	(14,234)	(16,978)	(15,338)	(29,394)	(8,443)	(38,885)	(10,591)	(49,192)	(13,286)	(60,634)	(16,665)	(75,537)	(20,905)	(92,228)
Investing Activities																		
Capital Expenditures		(127,767)	(127,767)	-	-	-	(5,591)	(5,591)	-	-	-	-	-	-	-	-	-	-
Cash Flow from Investing Activities		(127,767)	(127,767)	-	-	-	(5,591)	(5,591)	-	-	-	-	-	-	-	-	-	-
Net Change in Cash Position		106,302	(116,218)	14,234	2,744	2,811	927	(9,344)	20,986	(5,564)	28,739	(7,723)	32,469	(9,412)	40,207	(12,809)	47,909	(17,070)
Beginning Cash Position		-	106,302	(9,917)	4,317	7,061	9,872	10,799	1,454	22,440	16,876	43,614	35,892	68,360	58,948	98,155	85,346	134,255
Ending Cash Position		106,302	(9,917)	4,317	7,061	9,872	10,799	1,454	22,440	16,876	45,614	35,892	68,360	58,948	98,155	85,346	134,255	117,185
18 Year IRR on Equity Calculation (from 2009)		(76,660)	-	-	14,234	16,978	16,434	21,856	-	29,429	-	37,330	-	45,754	-	56,872	-	185,899
IRR on Initial Equity	17.3%																	

Table 9-19 shows an IRR calculation on the dredging and protective works portion of the Vergara project, funded by rental fees on container operations throughout the port. The basic assumptions are the same as for the Vergara terminals except for revenues based on total container traffic, not just that utilizing the Vergara terminal. Based on projected costs for the protective and dredging works, these appear to be feasible, offering sufficient cash flows to service debt and a return on the equity portion of the investment.

Fig. 9-1
Projected Revenue and Net Income - Probable Case



Figures 9-1 graphically presents projected revenues and net income.

Fig. 9-2
Projected Debt Coverage - Probable Case

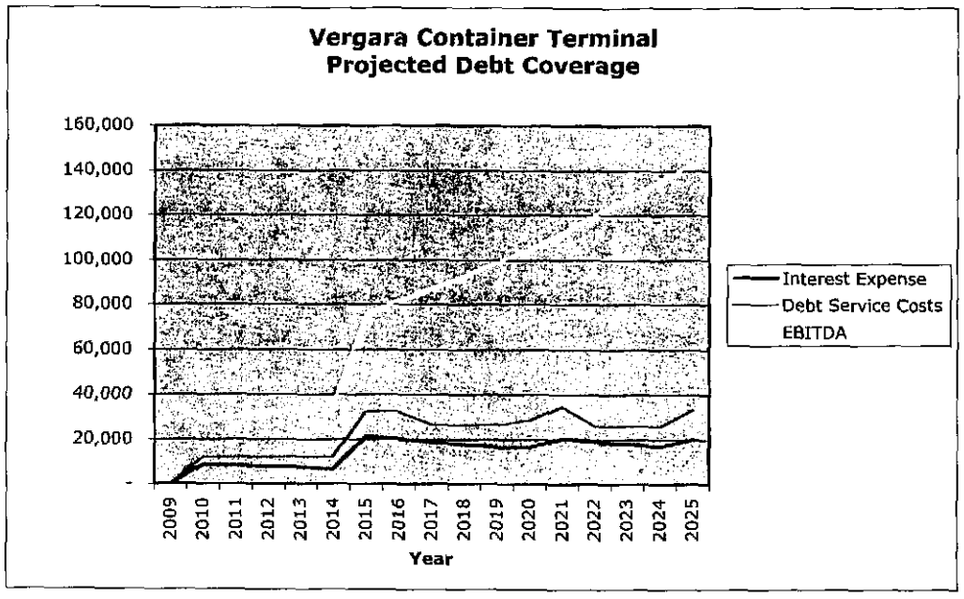
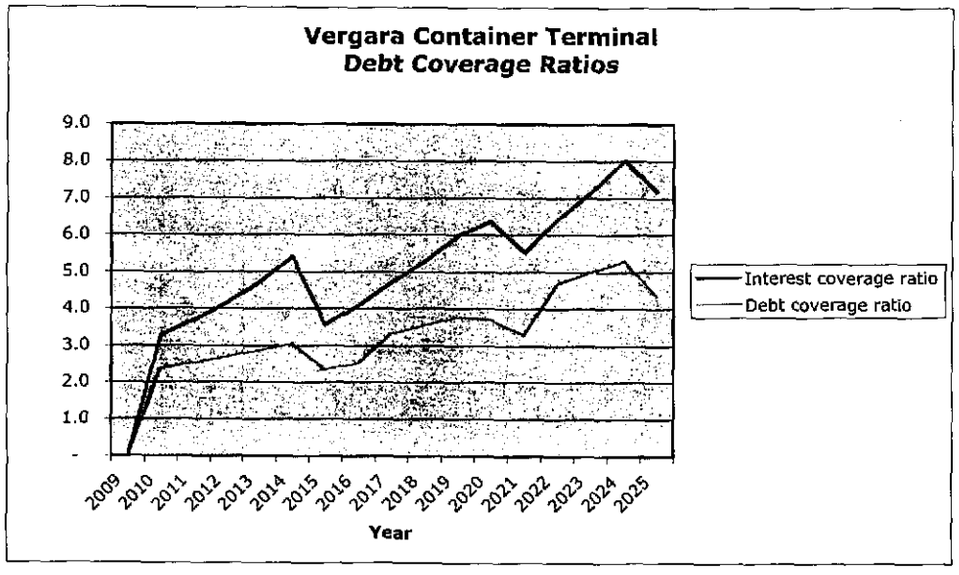


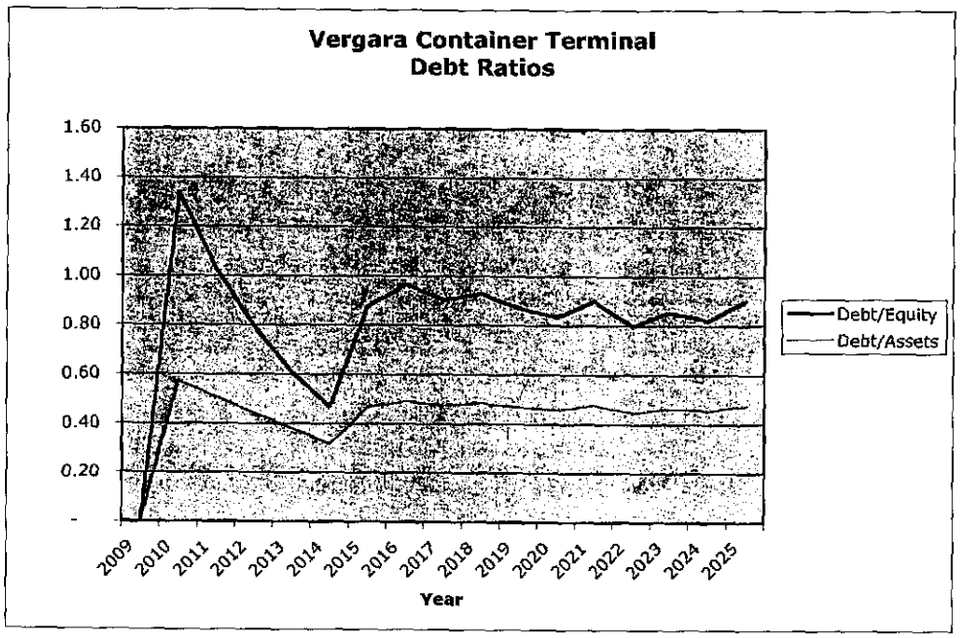
Figure 9-2 illustrates the projected relationship between earnings before interest, taxes, depreciation and amortization (EBITDA) and debt service costs.

Fig. 9-3
Projected Debt Coverage Ratios - Probable Case



Figures 9-3 illustrates the projected debt and interest coverage ratios over time.

Fig. 9-4
Projected Debt Ratios - Probable Case



Figures 9-4 illustrates the projected debt asset and debt equity ratios over time.

Grain Facility Pro-Forma Financials
Because of the nature of the incremental analysis, pro-forma financial statements are not developed beyond the analysis of incremental revenue. Figures 9-5, 9-6 and 9-7 show the debt coverage, debt coverage ratios and debt ratios for the grain facility program of improvements.

Fig. 9-5
Projected Debt Coverage - Probable Case

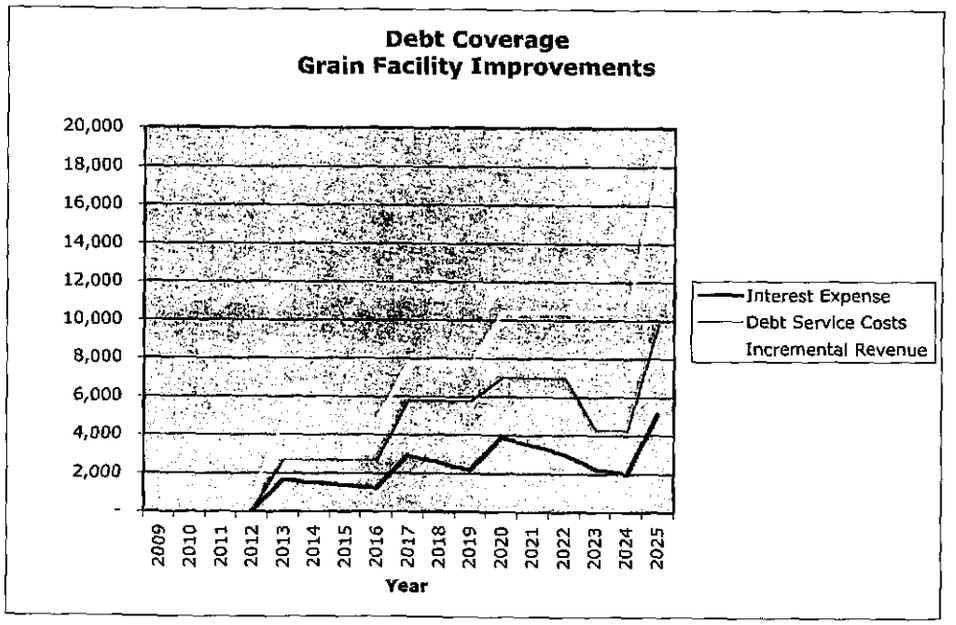


Fig. 9-6
Projected Debt Coverage Ratios - Probable Case

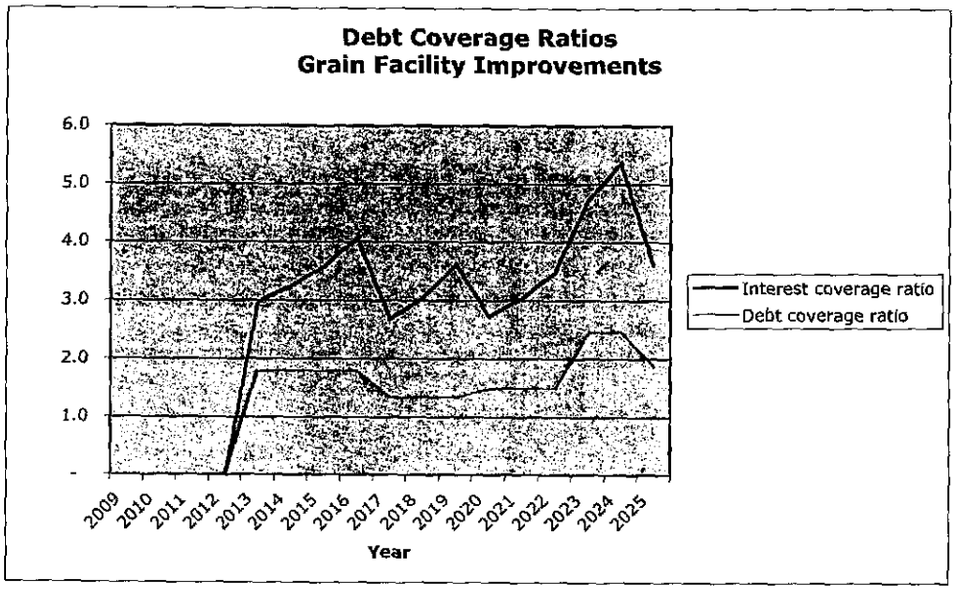
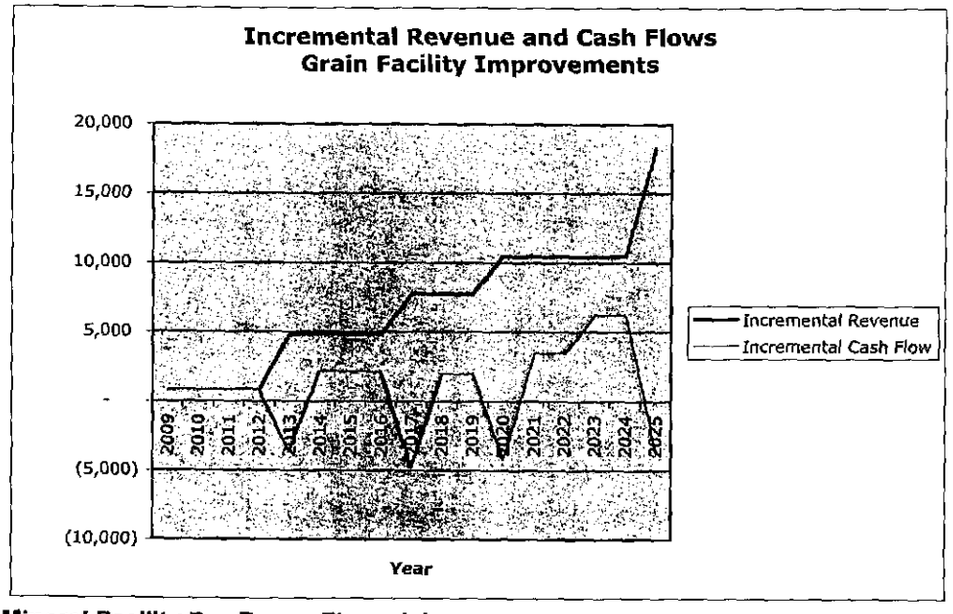


Fig. 9-7
Incremental Revenue and Cash Flow - Probable Case



Mineral Facility Pro-Forma Financials

Because of the nature of the incremental analysis, pro-forma financial statements are not developed beyond the analysis of incremental revenue. Figures 9-8, 9-9 and 9-10 show the debt coverage, debt coverage ratios and debt ratios for the grain facility program of improvements.

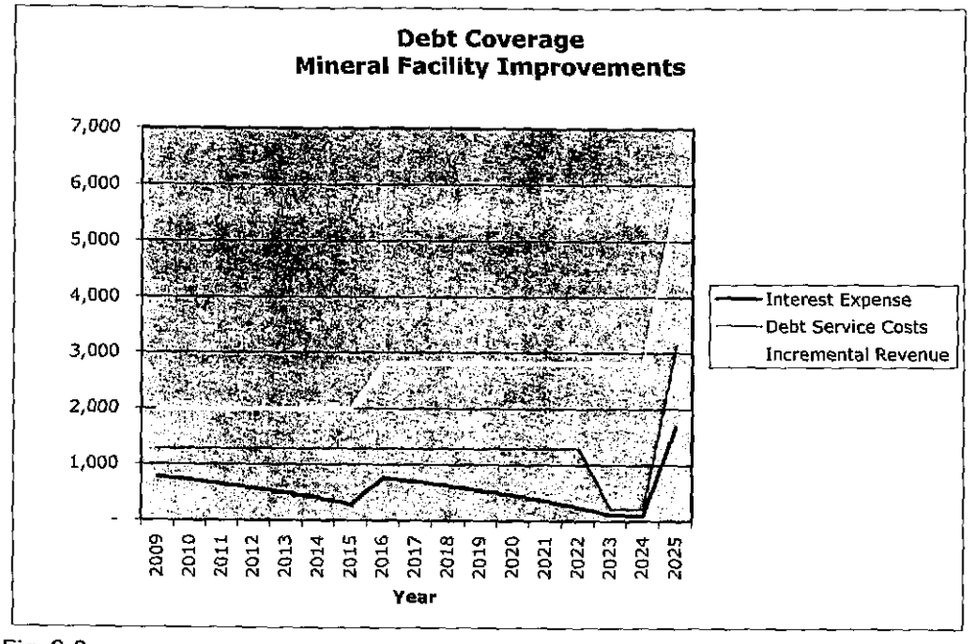


Fig. 9-8
Projected Debt Coverage - Probable Case

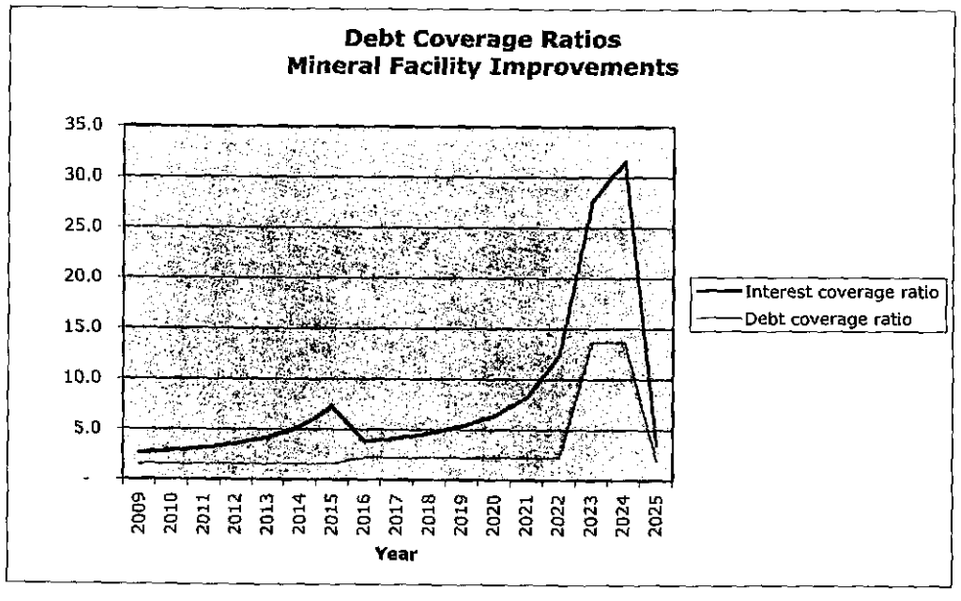


Fig. 9-9
Projected Debt Coverage Ratios - Probable Case

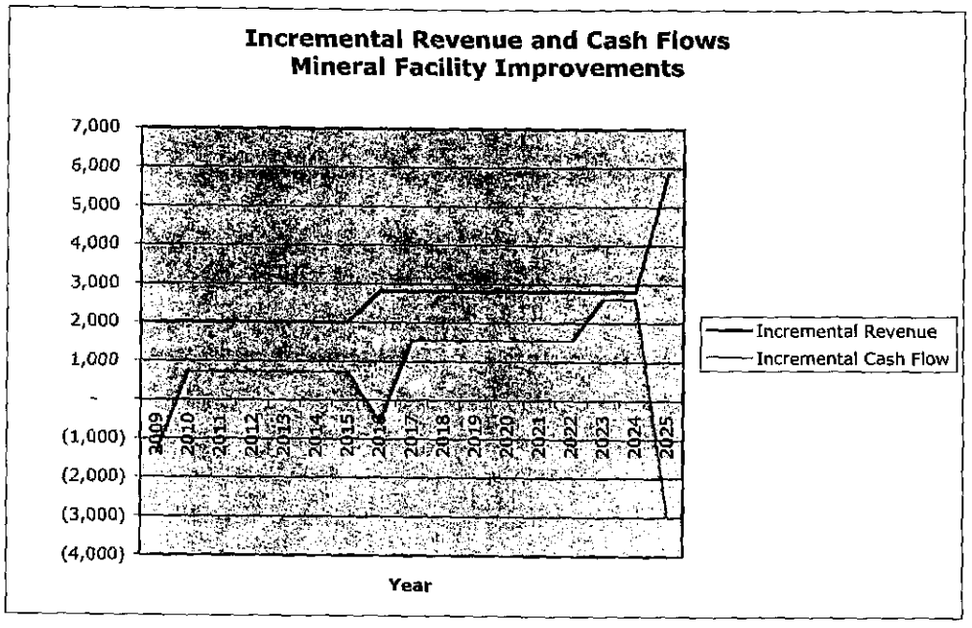


Fig. 9-10
Projected Debt Ratios - Probable Case

Financial Feasibility – Container Facilities
The above analysis indicates that the container facilities are financially viable. Using rates that are very conservative compared to current published tariff rates, the facilities not only provide adequate debt service coverage, but they provide an adequate rate of return on equity invested, even after a facilities rental fee of 25% of gross revenues.

Facilities fees are projected to grow from approximately $32M in 2010 to approximately $78M in 2025. These are funds that would be available to APIVER to fund infrastructure maintenance and improvements in connection with the container terminal as well as to fund the cost of construction of the civil works (breakwaters, channels and basins) necessary to establish operations at the new Vergara location (not including the cost of the berths themselves).

The analysis of the feasibility of the civil works also shows financial feasibility based on the availability of the fees to service debt and provide some return on equity invested.
Financial Feasibility – Container Facilities – Southern Terminal Alternative
An analysis was done to assess the financial feasibility of this alternative. The critical differences between this and the base-line alternative are:

- Five year delay in constructing the basin and protective works for Vergara.
- Less expensive terminal required for 2010 demand case.
- Delay in new facilities charge until 2015.
- Larger base of revenue available for facilities charge due to the five-year delay.

The net result of these circumstances is that both the container facilities as a whole and the harbor works at Vergara are both more financially feasible (based on IRR) under this alternate scenario.

Veracruz - Southern Terminal Alternative
Statement of Cash Flows: Probable Case
'000 USD

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Operating Activities																	
Net Income	-	22,788	22,126	21,482	20,860	20,260	27,734	32,256	36,876	41,342	45,900	49,427	54,060	57,334	62,871	66,471	69,541
Depreciation	-	2,609	2,609	2,608	2,608	2,608	11,051	11,051	11,051	11,051	11,051	11,698	13,273	13,273	13,273	13,273	15,685
Change in Working Capital	-	(6,515)	(439)	(439)	(439)	(439)	(9,147)	(1,169)	(1,169)	(1,169)	(1,169)	(1,169)	(1,576)	(1,576)	(1,576)	(1,576)	(1,576)
Cash Flow from Operating Activities	-	18,881	24,295	23,652	23,029	22,430	29,638	42,138	46,752	51,224	55,782	59,956	62,757	69,031	74,568	80,168	84,650
Financing Activities																	
Increase of Paid in Equity	10,000	27,218	-	-	-	-	61,039	-	-	-	-	3,685	18,903	-	-	-	14,486
Borrowing For Capital Program	-	50,559	-	-	-	-	142,425	-	-	-	-	9,065	44,104	-	-	-	33,781
Repayments of Debt	-	(1,988)	(2,227)	(2,494)	(2,793)	(3,129)	(6,916)	(11,166)	(9,270)	(10,383)	(11,629)	(13,923)	(16,206)	(8,746)	(7,557)	(8,464)	(12,926)
Dividends to Equity Investors	-	-	-	-	-	-	-	(107,464)	(35,646)	(48,291)	(45,399)	(48,328)	(44,861)	(41,017)	(80,625)	(72,611)	(35,585)
Cash Flow from Financing Activities	10,000	75,788	(2,227)	(2,494)	(2,793)	(3,129)	153,548	(118,571)	(44,916)	(58,674)	(57,028)	(49,500)	1,938	(47,764)	(88,183)	(81,075)	(40,182)
Investing Activities																	
Capital Expenditures	-	(77,777)	-	-	-	-	(203,464)	-	-	-	-	(12,950)	(63,005)	-	-	-	(48,230)
Cash Flow from Investing Activities	-	(77,777)	-	-	-	-	(203,464)	-	-	-	-	(12,950)	(63,005)	-	-	-	(48,230)
Net Change in Cash Position	10,000	16,893	22,068	21,158	20,236	19,301	18,721	(76,433)	1,836	(7,450)	(1,246)	(3,294)	1,690	21,267	(23,615)	(907)	(4,362)
Beginning Cash Position	-	10,000	26,893	48,961	70,119	90,354	109,655	129,376	52,943	54,780	47,329	46,083	43,789	45,479	66,746	43,131	42,225
Ending Cash Position	10,000	26,893	48,961	70,119	90,354	109,655	129,376	52,943	54,780	47,329	46,083	43,789	45,479	66,746	43,131	42,225	37,863
17 Year IRR on Equity Calculation (from 2009)	(10,000)	(27,218)	-	-	-	-	(61,039)	107,464	35,646	48,291	45,399	260,502	209,119	240,493	263,348	240,193	237,523
IRR on Initial Equity 38.0%																	

Table 9-20
Pro Forma Cash Flow for Vergara Terminal Project – Southern Terminal Alternative

Veracruz - Vergara Harbor Works - Southern Terminal Alternative
Statement of Cash Flows: Probable Case
'000 USD

		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Operating Activities													
Cash Income (Facilities Charge)	0.25	8,708	43,542	46,463	49,385	52,306	55,228	58,150	62,090	66,030	69,969	73,909	77,849
Interest on Harbor Works Debt		(19,492)	-	-	-	-	-	-	-	-	-	-	-
Cash Flow from Operating Activities		(10,784)	43,542	46,463	49,385	52,306	55,228	58,150	62,090	66,030	69,969	73,909	77,849
Financing Activities													
Equity Payment		80,014	-	-	-	-	-	-	-	-	-	-	-
Borrowing For Capital Program		186,700	-	-	-	-	-	-	-	-	-	-	-
Repayments of Debt		(6,731)	(7,539)	(8,443)	(9,456)	(10,591)	(11,862)	(13,286)	(14,880)	(16,665)	(18,665)	(20,905)	(23,414)
Dividends to Equity Investors		-	-	-	(46,463)	-	(52,306)	-	(58,150)	-	(66,030)	-	(73,909)
Cash Flow from Financing Activities		259,983	(7,539)	(8,443)	(55,920)	(10,591)	(64,169)	(13,286)	(73,029)	(16,665)	(84,695)	(20,905)	(97,323)
Investing Activities													
Capital Expenditures		(133,357)	(133,357)	-	-	-	-	-	-	-	-	-	-
Cash Flow from Investing Activities		(133,357)	(133,357)	-	-	-	-	-	-	-	-	-	-
Net Change in Cash Position		115,842	(97,354)	38,020	(6,535)	41,715	(8,941)	44,864	(10,940)	49,364	(14,725)	53,004	(19,474)
Beginning Cash Position		-	115,842	18,488	56,509	49,974	91,689	82,749	127,613	116,673	166,037	151,312	204,316
Ending Cash Position		115,842	18,488	56,509	49,974	91,689	82,749	127,613	116,673	166,037	151,312	204,316	184,843
11 Year IRR on Equity Calculation (from 2014)		(80,014)	-	-	46,463	-	52,306	-	58,150	-	66,030	-	258,752
IRR on Initial Equity	26.0%												

Table 9-21
Pro Forma Cash Flow for Vergara Harbor Works – Southern Terminal Alternative

Grain Handling Facilities Financial Feasibility

These proposed facilities consist of phased improvements to selected berths in order to concentrate the handling of grain imports. Proposed facilities include an upgrade to the Cargill facilities, the consolidation of grain handling to berth 6S and the new Berth 5 and the addition of improvements to these berths to automate the unloading process and provide improved storage and handling facilities.

Unlike the handling of container trade, the current trade of grain cargos to Veracruz are typically carried by handy sized, self-unloading ships. These vessels can and do use a wide variety of berths in the port. Ships are constrained by size, they are delayed in berthing, unloading is a lengthy process and the movement of trucks and railcars onto piers for receiving cargo causes intense congestion that complicates all of the Ports landside operations. In order to handle significantly increased volumes, the port needs facilities that provide greater speed in unloading. The financial feasibility analysis was performed as an incremental analysis to determine whether the increased speed of operations provides sufficient savings to justify an infrastructure charge that is sufficient to finance the improvements.

For this purpose, projected cargoes beyond the current capacity (with already planned additions to 2013) are assumed to be solely enabled by the presence of expanded facilities. Cargoes currently handled by the two principal grain berths are assumed to be moved to the new Berths 5N and 5S and will continue to be handled there with the benefit of the improvements. Based on the design parameters discussed above, the scheduled improvements of hoppers, conveyors and storage will provide an increased speed of up to 67% by 2025. Based on a factor of sharing this benefit to the customer, an increased infrastructure rate was calculated and used to determine whether this higher rate would be sufficient to provide for the financing and returns on the improvements.

Key assumptions in this model included:

- Tariffs comparable to current charges at Veracruz.
- 30% Equity Participation.
- Debt funding assumed at a blended interest rate of 15%.
- Dividends paid to equity investors out of excess cash flows.
- Capital costs and facilities demand based on probable case scenario.

The analysis indicates that the program for grain handling facilities is financially feasible as it provides a significant incremental return on equity investment while providing adequate cash flow coverage to pay the financing costs of the facilities.

Mineral Handling Facilities Financial Feasibility

These proposed facilities consist of phased improvements to selected berths in order to concentrate the handling of mineral imports (including scrap metal and fertilizer) in one zone of the port, automate the unloading process and provide improved storage and handling facilities.

Unlike the handling of container trade, the current trade of mineral bulk cargos to Veracruz are typically carried by handy sized, self-unloading ships. These vessels can and do use a wide variety of berths in the port. Ships are constrained by size, they are delayed in berthing, unloading is a lengthy process and the movement of trucks and railcars onto piers for receiving cargo causes intense congestion that complicates all of the Ports landside operations. In order to handle significantly increased volumes, the port needs facilities that provide greater speed in unloading. The financial feasibility analysis was performed as an incremental analysis to determine whether the increased speed of operations provides sufficient savings to justify an infrastructure charge that is sufficient to finance the improvements.

For this purpose, projected cargoes beyond the current capacity (sufficient to 2009) are assumed to be solely enabled by the presence of expanded facilities. Cargoes currently handled by the two berths that will be improved are assumed to be still handled there with the benefit of the improvements. Based on the design parameters discussed above, the scheduled improvements of hoppers, conveyors and storage will provide unloading time savings of from 57% up to 77%. Based on a factor of sharing this benefit to the customer, an increased infrastructure rate was calculated and used to determine whether this higher rate would be sufficient to provide for the financing and returns on the improvements.

Key assumptions in this model included:

- Tariffs comparable to current charges at Veracruz.
- 30% Equity Participation.
- Debt funding assumed at a blended interest rate of 15%.

- Dividends paid to equity investors out of excess cash flows.
- Capital costs and facilities demand based on probable case scenario.

The analysis indicates that the program for mineral handling facilities is financially feasible as it provides a significant incremental return on equity investment while providing adequate cash flow coverage to pay the financing costs of the facilities.

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10 Sources of Funding

10a Financing Requirements and Structure

The Study has identified a series of improvements and additions to port facilities to accommodate projected growth. These individual improvement projects can be characterized in four major types:

- Channels, basins and protective structures.
- Suggested improvements to private facilities operated under concessions from APIVER.
- Suggested improvements to APIVER controlled facilities that are utilized by private stevedoring firms.
- Suggested facilities to be constructed in the new area of Bahia de Vergara.

Each of these different project types brings with it different potential sources of funding as well as different required returns and mechanisms for repayment.

Channels, Basins and Protective Structures

The most notable of these improvements would be the construction of the new port at Bahia de Vergara. The major elements of this work such as dredging the channel and basin, building protective breakwaters and filling in land for terminals would be beyond the scope of any individual private terminal operator and would have to be undertaken and funded by APIVER or the Federal government. The question of identifying the source of capital and repayment funds for this work is critical as the feasibility of locating any new terminal facilities in the new areas is dependent upon it.

Since it is recommended that bulk shipments remain in the old port, dredging of the old port is necessary in order for the new terminal facilities to accommodate Panamax vessels. The costs of this project would also have to funded by APIVER or the Federal government.

Improvements to Existing Privately-Controlled Port Facilities

This type of improvement includes projects such as expansions of capacity at the Cargill Terminal. Any capital investments would have to be agreed upon during annual investment and operating plans under each concession. Financing would be the responsibility of the concessionaire.

Improvements to Existing APIVER-Controlled Port Facilities

The improvements in grain and mineral handling facilities fall in this category and are the primary responsibility of APIVER. These projects could be funded a number of ways. APIVER can use its financial resources to fund directly or through borrowing to fund these projects. Alternately, with the consolidation of operations, it is possible that specific berths be put out for concessions with the programmed improvements to be supplied by the concessionaire under the terms of their contract.

New Terminal Facilities at Bahia de Vergara

The proposed new container terminals fall in to this category. Although these could be funded in a number of ways, they are very good candidates for concession funding. The projects are financially feasible. On an international basis, concession financing of these facilities is very common and there are experienced sponsors and financiers available. Other alternatives could include a rental of the land directly to the terminal developer or the Port's development of the facility to suit a tenant operator.

10b Alternative Options and Sources of Funding

Financing for the projected container terminal can come from a number of sources depending on the financial and institutional parameters of the project. Key considerations in determining the funding for a specific project include:

- **Ownership**. Certain sources of funding are available only to private sector projects. Likewise, some sources, such as American OPIC funding, are only available to projects with some level of U.S. ownership.

- **Cash Flow.** For debt financing, the cash flow generated by the project is the principal source of money to repay the loan. The greater the cash flow in comparison to the total debt, the greater the availability of commercial credit.
- **Recourse**. The parties or facilities that lenders have recourse to. Under various structures, financing for the terminal may be backed by only the terminal's operations and plant, or those of the whole Port or those of outside private sector project sponsors. Increased recourse adds security to the loan, improving lending terms.
- **Guarantees**. Some lending either involves or requires outside guarantees of repayment. Project finance funding often requires guaranteed off-take contracts from the funded projects to insure that the project will make money. Funding of public sector projects often require that the national government guarantee repayment of the debt.
- **Instrument**. Financing can take several forms including equity investment, debt financing, loan guarantees (to lower borrowing costs), or export funding. Each of these instruments has its own variable features such as repayment term, interest rate, recourse and required guarantees.

The following sources of funding are available for projects like the proposed terminals. Not all of them can be utilized for each possible financial structure discussed above. The following summary states the availability and features of each type of financing.

Inter-American Development Bank (IDB)
The Inter-American Development Bank (IDB) is the oldest and largest regional multilateral development institution, established to help accelerate economic and social development in Latin America and the Caribbean. The IDB has formed a private sector finance group, including development of a new partial risk guarantee instrument, which allows privatized infrastructure projects to attract commercial and institutional funds at better terms and longer tenors. In private sector projects, IDB lends on its own account ("A Loans") and syndicates loans to other, private investors who invest alongside of IDB ("B Loans").

The Inter-American Investment Corporation (IIC) is another investor in private infrastructure that is part of the IDB Group.

IDB and IIC have lent money for privately developed maritime facilities such as:

- Mejillones Port Terminal. A Greenfield port for copper exports in Chile. US$59M total A and B loans. 2001.
- Terminales Portuarias Argentinas in Argentina: US$10M loan, US$50M total cost.
- IIC projects for private port facilities have included:
- Terminal 6 S.A. A privately developed oilseed export terminal on the Parana River in Argentina. US$ 1.0M IIC debt and US$3.0M IDB debt. 1989
- Port of M'Bopicua log and chip export facility in Uruguay. US$ 21M IDB A and B loans. 2002

U.S. Export Import Bank (Ex-Im Bank)
The U.S. Ex-Im Bank is an independent U.S. government agency that finances export sales of U.S. goods and services. It is the official export credit agency of the United States and it supplements and encourages, but does not compete with, commercial financing. This funding is available solely for U.S. exports.

The Ex-Im Bank enables U.S. exporters to compete internationally on the basis of product quality, service, and price by neutralizing the effect of export credit subsidies from other governments and by absorbing risks that the private sector will not accept. The Ex-Im Bank offers both direct loans and guarantees of loans made by commercial banks, up to 85% of the total export value from U.S. suppliers. Direct loans are extended to the foreign buyer, not to the U.S. exporter. Loan guarantees are provided to banks financing the export sales of a U.S. supplier. The basis of the guarantee transaction is virtually identical to that of the direct loan, and the impact upon the U.S. exporter and the foreign buyer are virtually indistinguishable from a direct loan transaction.

Long-term financing is available for amounts of $10 million or greater and repayment terms of seven years or more.

Medium term financing is available for amounts of $10 million or less and less than seven year repayment term.

Actual credit terms are subject to negotiation based upon American origin content in the project. Generally speaking, US content above the minimum thresholds can attract more aggressive terms and repayment conditions.

International Finance Corporation (IFC)
The IFC is an arm of the World Bank that provides financing and financial services for private-sector projects.

Like other multilateral lenders such as IADB, IFC loans on A/B structures combining their own money with syndicated loans from the private sector. In addition, IFC will take equity stakes in private sector companies.

IFC A-loans typically have 7 to 12 year maturities but grace and repayment periods are determined on a case-by-case basis. A-loans are usually limited to 25% of total estimated project costs for new facilities. A-loan amounts range from US$1M to US100M. IFC loans can be made with limited or no recourse to sponsors. IFC will actively underwrite the placement of B-Loans in the international financial markets.

Equity investments by the IFC are generally between 5 and 15% of the total project equity and will not take the largest interest or have an interest of over 35%.
Representative IFC lending:

- Manzanillo Container Terminal in Panama. US$25M (A-loan) and syndicated a further US$35M (B-Loans).
- Manzanillo Container Terminal, Mexico. US$45M A loan. 2004
- Suape International Container Terminal, Brazil. US$6M A-Loan.
- Comercializadora La Junta Marine Terminal. Grain handling terminal in Manzanillo, Mexico. US$4M A-Loan and $US7M B-Loan. 1997

Overseas Private Investment Corporation (OPIC)
OPIC is a US government agency that provides financing (loans or guarantees) for overseas projects in which there is a significant U.S. private sector ownership interest. This may be the case in a BOOT or concession structure for the proposed terminal.

OPIC loans are secured by a mix of project cash flow, sponsor support and collateral. Funding is sourced through a U.S. sponsor who holds at least 25 percent ownership of the equity in the project. At least 50 percent of the voting interest in the project should be held by private sector participants. Loans can be made to either the U.S. sponsor or to the project itself.

The term of OPIC loans is typically five to fifteen years following a suitable grace period. OPIC guaranteed loans are backed by the full faith and credit of the U.S. government.

Bilateral credit agencies nearly always have country-specific and often project-type specific criteria in mind at given points in time. This means that transportation facilities in Mexico will very likely have a varied audience of enthusiastic supporters among the bilaterals. In the majority of cases, however, the support of the Mexican government will be required to gain the interest and active support of these agencies.

Equity Investments by Project Sponsors/Developers
Equity investment is a key part of the financial strategy of any project structure. Equity investment determines ownership and control, promotes commitment to the project and reduces the debt repayment

10c Matrix of Alternative Options

Source of Funding	Advantages	Disadvantages
Inter-American Development Bank	Lower cost of debt financing.	Additional complication of structure and institutional requirements.
US Export-Import Bank	Lower cost of debt financing for equipment.	Additional complication of limitation on sources of supply.
International Finance Corp.	Lower cost of debt financing.	Additional complication of structure and institutional requirements.
US Overseas Private Investment Corporation	Lower cost of US equity capital due to lower risk.	Additional complication of structure and institutional requirements.
Project Sponsor/Concessionaire Equity	No cost to APIVER.	Control limited under terms of project or concession agreement.
Private Debt Investment	Reduces equity requirement	Increased cash flow requirement to service interest. Higher rates than multilateral lenders.
APIVER Investment	Control by APIVER	Potential for investment in non-marketable facilities. Limitation of resources.
Federal Investment	Potential for investment beyond resources of API or Concessionaires	Dependent on federal government action. Loss of control.

11 Preparation of Guidelines for Concession

11a and 11b Description of Alternative Financial Structures
The following descriptions of alternative financial structures are based on generally used structures which are employed globally. The advantages and disadvantages are discussed in terms of access to capital, risk and level of control as it pertains to the Port and possible contracting parties.

In practice, other considerations such as legal limitations, macro-economic issues, taxation and local and national political considerations have a significant role in determining the financial structure ultimately used. These considerations are outside of the scope of this study and are not included in the following analysis.

Potential financial structures include:

Port Developed, Owned and Operated Facility
The most straightforward financing structure is for the Port to be the developer, owner and operator of the proposed new facilities. Financing would be raised on the basis of the cash generating capacity of the terminal along with the overall creditworthiness of APIVER. The investment in the capital costs and working capital requirements of the new terminal would come from cash held by APIVER and/or debt issued by the port to local and/or international lenders.

Advantages:
The chief advantage of this financial structure is the level of control. As sole owner and operator, the Port controls all aspects of the project. Most importantly, if the project generates sufficient cash, APIVER controls all of the profits (above and beyond debt service costs) and can direct them towards any other port spending or investing priorities. Self-financing is most likely the most cost effective path for APIVER inasmuch as any alternative financing mechanisms and/or support would attract mark-ups for business risk, competing projects in the region and currency risk among others. While spreading these risks may make some business sense, it could be that in the final analysis of real numbers, the compounding effects of outside financing costs drive overall project costs outside the feasibility i.e., pay-back, brackets.

Disadvantages:
Disadvantages include the assumption of substantial financial and commercial risks. Any financial risks that are not assumed by lenders or the national government are borne by the Port. These risks would include cost over-runs, failure of the market for container shipping to develop, etc. Another disadvantage is the need for the Port to invest its own equity into the project alongside the debt portion of the financing. This equity may not be available in the necessary timeframe or may be better deployed in the development of other Port facilities.

Port Developed, Owned and Leased Facility
Similar to the above except that the port leases the facility to an operator instead of operating it with Port staff.

Advantages
Typical terms would include a fixed monthly payment plus a percentage of gross revenue. Lease payments from a creditworthy lessee are a stable source of income for the port and are not dependent on fluctuating traffic. The Port does not need to set up the administrative infrastructure for maintaining and operating the facility.

Disadvantages
Lack of direct control of operations may be a disadvantage. In addition, there may be coordination issues between the terminal lessee and the Port over facilities and services that remain under Port control. Other than the credit risk of a marginal operator or business cycles outside their control, most disadvantages are manageable.

Build-Operate-Transfer and Build-Own-Operate-Transfer (BOT and BOOT) Facilities
BOOT structures are an intermediate step between port-owned and privately-owned facility structures. The BOT structure is similar with the exception that ownership technically remains with the port. The choice of one or the other usually depends on local legal and institutional restrictions. Under these structures, the port would define and substantially design the desired facility. Private builders/operators would competitively bid for the opportunity to build, (own) and operate the facility for a lengthy fixed period (typically on the order of thirty years) on a concession granted by APIVER. At the end of that period, the facility would be turned over to the port. Bidders would structure their bids to reflect their receipt of the return of their investment and an acceptable profit over the operating period.

Advantages
The chief advantages of this structure are the retention of control over the design of the facility along with the shift of certain risks to the builder/operator. By defining the project in advance, the port can dictate design and capacity considerations that may not be considered financially feasible in the near term by a strictly private developer. An example would be to dictate the use of new, 100 ft. gauge cranes to meet anticipated future demand instead of allowing a private developer to use refurbished 50 ft. gauge cranes which may be more economical in the short term.

In many instances, private operators can build and operate facilities more cost effectively than a public agency. Frequently these players can attract or in some cases bring their own business to the terminal. Thus, even if the shared income stream proved low in the early years, APIVER can emerge downstream as a larger regional port with business risks assumed by others.

The Port would typically pay the builder/operator a negotiated fee to operate the facility. The agreement covering this would take into account variables, such as inflation, labor costs and energy costs that are beyond the control of the builder/operator.

In terms of financial risk, much of this is shifted to the builder/operator. The builder/operator will be responsible for the financing, construction and operation of the facility. Depending on the financial markets and the business aspects of the facility, the Port and/or the national government may be required to provide guarantees as to revenue level, debt repayment, etc. The more commercially conservative the project, the fewer of these types of guarantees need to be made. The burden to produce a commercially healthy terminal shifts to the operator, meaning that APIVER is positioning itself as a tenant manager.

Disadvantages
One of the limitations of this kind of project is the limited control that the Port would have on the development and operations of the project after the initial development agreement has been made. Another disadvantage is the necessary complexity of the contractual arrangements for this kind of project. Aspects to be addressed include unanticipated costs (energy etc.), maintenance and capital improvements over the life of the project, required condition of the facility at the end of the project period, division of liabilities, responsibility for permitting and dispute resolution. APIVER will need to take steps to see that its goals are met and that their goals are shared to some degree with the builder/operator. Also, the quality of installed facilities will require close attention to assure that their expected life cycle is greater than the life of the contract.

Public/Private Partnership
In some cases, a new enterprise owned jointly by public entities and private investors can be created to develop and operate a facility such as a terminal. This allows for a sharing of resources and expertise from the various participants. In a port facility, participants may include the Port (as a public entity), shipping lines, key users of the facility or railroads that service the facility. Typically, a new legal entity is formed with participants sharing ownership based on their contributions (in equity (cash) or other assets (land, etc.). The new entity then undertakes the design, operation and construction of the new facility utilizing the contributed assets as well as any other financial or commercial guarantees granted to the new entity.

Advantages
One of the key advantages in a public/private partnership arrangement is the combination of resources and commitments from the various parties involved. If the facility is to have one key customer, it allows the development process to "lock-in" the customer as a partial owner and developer. This structure would also allow the Port to retain ongoing influence (through its ownership interest) throughout the life of the project. By involving other commercially interested parties, this structure would tend to influence the project towards increased financial viability.

Disadvantages
As with any alternative that is not a sole endeavor of the Port, there is a surrender of direct control under the public/private structure. Neither the physical scope, nor the operations of the facility will be directly controlled by the Port. Likewise, unlike more clearly private structures, the Port will retain some financial liabilities (shared with the other owners) in the event that the project is not profitable. Furthermore, it is not uncommon for priorities of one or both sides of the partnership to change over time. The result can be unwanted calls for capital, unwanted buyouts or resolution of other disputes not foreseen at the time the partnership was formed.

Concession
A concession is another structure between strictly public and strictly private ownership. It closely resembles a BOOT/BOT structure with the substitution of operational and development goals instead of a specific facility as the basis for agreement. A concession is basically a right to establish and operate a facility (existing and/or new) within very broad parameters. The grantor of the concession would typically have very limited control beyond the confirmation that the terms of the concession agreement are being adhered to. A concession is typically awarded based on objective criteria such as committing to the highest fee paid to the Port in addition to meeting the stated goals.

Because a concession is typically based on service provision, the control of existing facilities (along with the revenue that they generate) is part of the agreement. Thus a concession for a container terminal might involve granting the concessionaire the rights to operate the existing berths 1, 2 and 3 with the requirement that a new container facility of a certain capacity at that location be completed by year 5. Additional goals may require the concessionaire to complete further phased development over the life of the agreement, typically twenty to thirty years.

Advantages
The concession structure allows the grantor to specify the form and timeline of development of the facilities while making essentially no financial commitments to the project. This structure allows entities with very limited financial capacity to effectively undertake long-term development strategies.

Disadvantages
Along with the lack of financial risk comes the lack of reward. Although the Port achieves its purpose of supplying the required facilities and services to its customers, it receives no payment beyond the agreed concession fees. If the project in question has significant surplus revenue generating capacity, it benefits the concessionaire more than the Port.

Another disadvantage of a concession is the difficulty of establishing and altering the concession relationship to reflect changes over the life of the concession agreement.

Private Development
The most straightforward financial structure on the private side is to simply sell or lease land to a private company for their use in building and operating a new container terminal. This alternative fulfills the Port's purpose in providing additional facilities for the Port's customers with little participation by the Port.

Advantages
Under this structure, the Port takes on little risk and incurs few expenses in the development of the new facility. The Port would receive either the purchase price proceeds or rental income from the facility developer. These funds can than be used for other needed facilities improvements.

Disadvantages
This option is often not legally feasible. Clearly, this alternative provides the least ongoing control to the Port. This includes the risk to the Port that the facility owner may fail in its marketing and operating activities resulting in a loss of business to the Port.

11c Recommended Financial Structures
New Container Terminals
This is a somewhat speculative recommendation as it is dependent on the final structure for the construction of the new port at Bahia de Vergara. Assuming that this is done by APIVER and/or the federal government, a financial structure for the individual terminal improvements is necessary. Over the past ten years or so, concession structures have become the norm in Mexican ports in general and in Veracruz in particular. Our understanding of the history of the Port is that the trend towards private operations has been strategic and highly successful in building the Port's competitiveness and shipping volumes.

Based on APIVER's experience, current practice in Mexican ports and the financial feasibility of the project, it is recommended that the container terminals be built by private terminal developers/operators under a concession program. The phasing of the program allows for existing concessionaires or others to bid for the opportunity to operate new facilities in the Vergara area. By controlling the process through the concession procedure, APIVER can insure that strategically necessary facilities are provided.

The analysis above indicates that a concessionaire would have access to multiple sources of finance to fund the terminal construction. The feasibility analysis indicates that there will be sufficient income to allow for a rental or infrastructure charge to be paid under the terms of the concession to allow for at least partial funding of the Vergara civil works and ongoing maintenance and improvements. The container terminal on part of Talleres Navales de Golfo can be developed by the existing concessionare, with a specialized container terminal operator, although the remaining life on the concession may be insufficient to amortize needed investment.

New Grain Terminals
The program for expansion of grain terminals consists of three distinct types of projects. A new grain terminal that is currently under negotiation with a potential concessionaire is considered to be outside of the scope of this analysis. The projected additional capacity of this project is, however considered in establishing the program.

The proposed improvements to the Cargill terminal are analyzed in this report. The financial structure of this project would be governed by negotiations between APIVER and Cargill.

The establishment of additional dedicated grain handling facilities as envisioned in this report could be accomplished in a number of ways. The financial feasibility analysis indicates that these facilities would generate sufficient revenues to make them financially feasible under a number of different financial structures. Because of the physical proximity of the proposed facilities at berths 4 and 6 South, these facilities could be developed as one or more concessions with the result that APIVER would no longer operate any grain unloading piers and four or more concessionaires would compete for the business.

As with the container terminals, the grain terminal improvements (taken as a whole) will generate sufficient revenue to make them financially feasible, providing an adequate internal rate of return (IRR) and sufficient debt coverage. As with container terminals, private companies and multilateral lending agencies often invest in grain terminal projects throughout Latin America.

Since the existing conveyors at Berth 6 South connect with the TCE storage facilities, improvements to this berth should be integrated into the terms of the existing TCE concession. Improvements to Berth 4 can be a separate concession or offered for the use on a new or existing concessionaire at the port such as TCE, Cargill or TMV. New grain unloading systems at Berth 5, under construction, can be developed with TCE, and/or new concessionares.

New Minerals Facilities
The consolidation of bulk mineral shipments to two adjacent berths (6N and 7S) provides an opportunity to offer a concession for the construction and operation of such facilities. Because of their proximity, these could be offered together or separately. Economies could probably be realized by using common storage and truck/rail load-out facilities, arguing for a single concessionaire. The advantage to the port of offering shippers competitive operators argues for having two concessions.

As with the other facilities discussed above, the mineral handling terminal improvements (taken as a whole) will generate sufficient revenue to make them financially feasible, providing an adequate IRR and sufficient debt coverage.

There were no examples found of concession-developed general-purpose mineral bulk facilities being built with multilateral funding. In the event that no concessionaire can be found to commit to these facilities, it may be in the Port's interest to fund and operate the improvements in order to achieve the advantages to overall Port operations due to faster ship processing and lower landside congestion due to truck and rail traffic onto the piers.

11d Guidelines for Concession Procedure.

Mexican API organizations in general, and APIVER in particular, have a distinguished record of organizing concession procedures that have successfully resulted in substantial new port infrastructure projects. It is assumed that APIVER will full utilize its experience to date in order to optimize the concession procedures to meet their particular needs.

In order to best conduct competitive concession procedures, certain additional factors should be studied that were not addressed in this report:

APIVER should research optimal levels of competition based on projected volume to determine the total number of concessionaires in each facility type. This will help to determine, for instance, whether there should be two or three container terminal operators or if new grain facilities should be developed by a fourth concessionaire or negotiated as part of existing concession agreements.

APIVER should research the level of interest among potential developers and assess key concerns of concessionaires that would help to lower their risks and promote competitive interest. Examples may include coordination with other port improvements, length of concession or competition with APIVER controlled facilities.

As this is a time-consuming procedure, APIVER should allow at least one year to establish the final processes and prepare the bidding documents. The advertising, evaluation and award of concessions should be allowed at least an additional six to nine months. There will also be substantial time necessary to establish operations and execute the needed facilities construction. An evaluation of this time requirement prior to the 2009 need date for initial facilities described in this report will result in the needed start date for the concession process.

Bidding Rules
The rules of the competition that would award any concessions should include the following terms:

1. Information provided should be sufficiently comprehensive to allow bidders to bid with minimal risk. Bidding documents should include:
    a. References to all applicable laws and regulations
    b. Detailed engineering data on any existing land or facilities subject to the bid.
    c. Detailed schedule, operational and design requirements for any required capital improvements
    d. Detailed information on terms of final concession agreements.

2. Bidding rules should be comprehensive and include clear rules covering:
    a. Eligibility of bidders.
        i. Technical ability
        ii. Financial resources
        iii. Ownership and structure
    b. Contents of bid packages
    c. Detailed description of the evaluation criteria including:
        i. An objective scoring system to qualify bidders
        ii. Objective pricing rules to identify the best qualified bid.
    d. Procedures for disputes and appeals
    e. Rules and procedures for allowing changes in a bidding group or their submissions.
    f. Timeline for evaluations and selections

3. The concession process should be published internationally with ample notice to attract the widest interest of potential bidders and allow for the establishment of competent bidding groups.

4. The identity of all bidding groups and their members should be publicly disclosed, as should the list of qualified bidders and their scores.

5. The final pricing criteria should be simple and transparent. For example, the bidders would compete on the rental to be paid for the use of the land and/or facilities of the port with the highest rent winning the concession (all other terms being fixed in the bidding documents). The tariff to be charged and escalation could also be factors, with preference being given to lower tariffs, if other factors such as rental to APIVER were equal. In either case, the pricing criteria and factor or factors should be clearly stated in advance, and the weights given to each factor in the evaluation disclosed in advance.

6. Attempts should be made to time the competitions to allow for existing port operators to compete without violating rules against controlling multiple facilities. The phasing of the container terminals would allow for CICE and ICAVE to compete for the new terminal opportunities as their existing concession periods end.

7. Outside expertise should be retained to assist in the evaluation of the bid packages. The names and affiliations of the evaluation panel should be publicly disclosed.

Pricing

In order to take advantage of the competitive nature of a concession, APIVER should structure the concession to maximize their revenue while meeting the goals of improving the facilities and operations of the port. In the case of the facilities improvements discussed in this report, the various terms of the concession agreement should be set prior to advertising with the exception of the rental payable to APIVER. A qualified bid package would include the bidders' commitments to meet all of the goals established for facilities construction, financial resources and operational abilities. The winning bidder should be the one that meets all of the other criteria and proposes the highest rental (percentage of gross revenue) to APIVER.

Time Period

The time period of the concessions should be sufficient for the concessionaires to realize the payback and return of their investments in the facilities that are built. A time period on the order of fifteen to twenty years would be reasonable.

Procedures

The overall recommended procedure for each concession will be as follows:

- Establish timing and extent of each concession package.
- Research competitive situation, potential interest levels and risk reduction strategies.
- Prepare bid packages and detailed bidding rules.
- Advertise and distribute bid packages.
- Qualify bidders.
- Request pricing proposals from qualified bidders.
- Award concessions.
- Resolve any disputes.
- Execute contracts.

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APPENDIX A
POTENTIAL U.S. VENDORS AND SOURCES OF SUPPLY

SUPPLIED PRODUCTS

1. *CONTAINER CRANES*
2. *RUBBER TIRED GANTRIES (RTG)*
3. *CONTAINER LIFT TRUCKS*
4. *BERTH FENDERS*
5. *BOLLARDS*
6. *CRANE RAIL, RAILROAD RAIL*
7. *CRANE RAIL ACCESSORIES*
8. *CRANE RAIL WELDING SYSTEM*
9. *PANZERBELT AND CABLE HORNS*
10. *EPOXY AND CEMENTITIOUS GROUT*
11. *CONCRETE ADDITIVES*
12. *COATINGS*
13. *DRILLED SHAFTS*
14. *LIGHT TOWERS*
15. *ELECTRICAL CONTROLS AND SUBSTATION*
16. *PIPING SYSTEMS*
17. *WELDING ELECTRODES*
18. *STEEL PLATE*
19. *NAVIGATION AIDS AND BUOYS*
20. *REBAR COUPLERS*
21. *EPOXY ANCHORS*
22. *PIPE PILES*
23. *BULK MATERIALS HANDLING*
24. *MARINE TERMINAL PLANNING AND ENGINEERING*
25. *DREDGING*
26. *COMPUTER MANUFACTURERS*
27. *FINANCIAL SOFTWARE*
28. *MAINTENANCE SOFTWARE*
29. *POWER SYSTEMS*
30. *TERMINAL OPERATING SYSTEMS SOFTWARE*
31. *FIRE PROTECTION SYSTEMS*
32. *FIRE APPARATUS*

A.1 CONTAINER CRANES

Supplier Name:	PACECO
Address:	Corporate: 3854 Bay Center Pl., Hayward, CA 94545 Regional: 3064 C Bienville Blvd, Ocean Springs, MS 39564
Telephone:	Corporate: (510) 264-9288 Regional: (228) 872-1733
Fax:	Corporate: (510) 264-9280 Regional: (228) 875-8875
Email:	Corporate: email@paceco.com Regional: paceco@datasync.com
Contact Name:	Regional: Sales Mgr. Chuck Melaney
Web:	www.pacecocorp.com

A.2 RUBBER TIRED GANTRIES (RTG)

Supplier Name:	Kalmar, Inc., Latin America Sales
Address:	777 Bricknell Avenue, Suite 1350, Miami, FL 33131-2803
Telephone:	(305) 379-6200
Fax:	(305) 379-8822
Email:	Mikko.vuojolainen@kalmarind.com
Contact Name:	Mikko Vuojolainen
Web:	www.kalmarind.com
Supplier Name:	Mi-Jack Products, Inc. In-Terminal Services
Address:	3111 W.137th Street, Hazel Crest, IL 60429
Telephone:	(708) 596-5000
Fax:	(708) 225-2312
Email:	johnttroop@interminalservices.com
Contact Name:	John T. Troop
Web:	www.mi-jack.com

A.3 CONTAINER LIFT TRUCKS

Supplier Name:	Kelly Tracktor Co. (KTC)
Address:	8255 NW 58th, Miami, FL 33166
Telephone:	(305) 592-5360
Fax:	(305) 477-2024
Email:	ktccat@kellytracktor.com
Contact Name:	Sales
Web:	www.kellytracktor.com/taylor.htm
Supplier Name:	Kalmar, Inc., Latin America Sales
Address:	777 Bricknell Avenue, Suite 1350, Miami, FL 33131-2803
Telephone:	(305) 379-6200
Fax:	(305) 379-8822
Email:	Mikko.vuojolainen@kalmarind.com
Contact Name:	Mikko Vuojolainen
Web:	www.kalmarind.com

A.4 BERTH FENDERS

Supplier Name:	Svedalla Industries Inc. Svedalla-Trelex
Address:	3588 Main Street, Keokuk, Iowa 52632
Telephone:	(319) 524-8430
Fax:	(319) 524-7290
Email:	Larry.kester@metso.com
Contact Name:	Larry Kester
Web:	
Supplier Name:	Maritime International, Inc.
Address:	100 E Vermilion, Lafayette, LA 70501
Telephone:	(337) 237-1611
Fax:	(337) 237-6770
Email:	info@maritime-international.co
Contact Name:	John Deats
Web:	www.maritime-international.com

A.5 BOLLARDS

Supplier Name:	BLUE WATER MARINE DIV. International Marine and Specialty Supply.
Address:	P.O. Box 266599 Houston, TX 77207-6599 7509 Wynlea St., Houston, TX 77061
Telephone:	(713) 645-0192
Fax:	(713) 643-2292
Email:	oilcovery-bluewater@worldnet.att.net
Contact Name:	Steve Jannik, Patricia Valle
Web:	
Supplier Name:	Maritime International, Inc.
Address:	100 E Vermilion, Lafayette, LA 70501
Telephone:	(337) 237-1611
Fax:	(337) 237-6770
Email:	info@maritime-international.co
Contact Name:	John Deats
Web:	www.maritime-international.com
Supplier Name:	J.C. MacElroy Company, Inc.
Address:	91 Ethel Road West P.O. Box 850, Piscataway, NJ 08855
Telephone:	(732) 572-7100
Fax:	(732) 572-7112
Email:	info@macelroy.com
Contact Name:	Sales
Web:	www.macelroy.com

A.6 CRANE RAIL, RAILROAD RAIL

Supplier Name:	Birmingham Rail Division Birmingham Rail & Locomotive Co
Address:	P. O. Box 530157 Birmingham, AL 35253-0157
Telephone:	800-241-2260; 205-424-RAIL(7245)
Fax:	205-424-7436
Email:	BHAMRAIL@AOL.COM
Contact Name:	
Web:	www.bhamrail.com
Supplier Name:	L.B.FOSTER CO.
Address:	International Sales, 7015 Fairbanks-North Houston Rd. Houston, TX 77040
Telephone:	(713)466-2700
Fax:	(713)466-2709
Email:	sfisher@lbfoster.com, glippard@lbfoster.com, lruemler@lbfoster.com.
Contact Name:	Sam Fisher, Sr. VP; Greg Lippard, VP; Laurie Ruemler
Web:	www.lbfoster.com
Supplier Name:	Atlantic Track, Crane Runway Division
Address:	St. Clair Industrial Park, RD#3, St. Clair, PA 17970
Telephone:	(570) 429-1462
Fax:	(570) 429-2273
Email:	frankj@atlantictrack.com
Contact Name:	Frank J. Jroski
Web:	www.atlantictrack.com

A.7 CRANE RAIL ACCESSORIES

Supplier Name:	Gantrex Corp.
Address:	17 Daphne Drive, Norwalk, CT 06851 275 Curry Hollow Road, Pittsburgh, PA 15236
Telephone:	Norwalk (203) 849-9160; Pittsburgh (412) 655-1400
Fax:	Norwalk (203) 846-8228; Pittsburgh (412) 655-3814
Email:	bob.stlawrence@gantrex.com; art.avlon@gantrex.com;
Contact Name:	Bob St. Lawrence
Web:	www.gantrex.com
Supplier Name:	Atlantic Track, Crane Runway Division
Address:	St. Clair Industrial Park, RD#3, St. Clair, PA 17970
Telephone:	(570) 429-1462
Fax:	(570) 429-2273
Email:	frankj@atlantictrack.com
Contact Name:	Frank J. Jroski
Web:	www.atlantictrack.com

A.8 CRANE RAIL WELDING SYSTEM

Supplier Name:	Orgo-Thermit, Inc.
Address:	3500 Colonial Drive North, Lakehurst, NJ 08733
Telephone:	(732) 657-5781
Fax:	(732) 657-5899
Email:	info@orgothermit.com
Contact Name:	Sales office
Web:	www.orgothermit.com
Supplier Name:	Gantrex Corp.
Address:	17 Daphne Drive, Norwalk, CT 06851 275 Curry Hollow Road, Pittsburgh, PA 15236
Telephone:	Norwalk (203) 849-9160; Pittsburgh (412) 655-1400
Fax:	Norwalk (203) 846-8228; Pittsburgh (412) 655-3814
Email:	bob.stlawrence@gantrex.com; art.avlon@gantrex.com;
Contact Name:	Bob St. Lawrence
Web:	www.gantrex.com
Supplier Name:	Holland Industrial Maintenance
Address:	1000 Holland Drive, Crete, IL 60417
Telephone:	(708) 672-2300
Fax:	(708) 672-0119
Email:	bsikora@hollandco.com
Contact Name:	Bruce W. Sikora
Web:	www.hollandco.com

A.9 PANZERBELT AND CABLE HORNS

Supplier Name:	Gantrex Corp.
Address:	17 Daphne Drive, Norwalk, CT 06851 275 Curry Hollow Road, Pittsburgh, PA 15236
Telephone:	Norwalk (203) 849-9160; Pittsburgh (412) 655-1400
Fax:	Norwalk (203) 846-8228; Pittsburgh (412) 655-3814
Email:	bob.stlawrence@gantrex.com; art.avlon@gantrex.com;
Contact Name:	Bob St. Lawrence
Web:	www.gantrex.com
Supplier Name:	Atlantic Track, Crane Runway Division
Address:	St. Clair Industrial Park, RD#3, St. Clair, PA 17970
Telephone:	(570) 429-1462
Fax:	(570) 429-2273
Email:	frankj@atlantictrack.com
Contact Name:	Frank J. Jroski
Web:	www.atlantictrack.com

A.10 EPOXY AND CEMENTITIOUS GROUT

Supplier Name:	FIVE STAR PRODUCTS, INC.
Address:	Corporate. 425 Stillson Road, Fairfield CT 06430 Regional: 27East Crisman Road, Blairstown, NJ 07825
Telephone:	Corp. (203) 336-7900; Reg. (908) 362-7170
Fax:	Corp. (203) 336-7930; Reg. (908) 362-7180
Email:	carlsonb@fivestarproducts.com
Contact Name:	Robert Carlson, Regional Manager
Web:	www.fivestarproducts.com
Supplier Name:	CONESCO, Inc.
Address:	1551 Pioneer Road, Salt Lake City, UT 84104
Telephone:	(801) 972-8777
Fax:	(801) 972-8315
Email:	info@conescoinc.com
Contact Name:	Sales
Web:	www.conescoinc.com
Supplier Name:	Texas Resins Corporation
Address:	1400 S.Sherman #118
Telephone:	(972) 480-8775
Fax:	(972) 480-8337
Email:	sales@texasresins.com
Contact Name:	Sales
Web:	www.texasresins.com

A.11 CONCRETE ADDITIVES

Supplier Name:	Grace Construction Products
Address:	62 Whittemore Avenue Cambridge, MA 02140
Telephone:	877-423-6491
Fax:	877-423-6492
Email:	concrete@grace.com
Contact Name:	Sales
Web:	http://www.graceconstruction.com/
Supplier Name:	Sika Corporation
Address:	201 Polito Avenue Lyndhurst, NJ 07071
Telephone:	201-933-8800
Fax:	201-933-6225
Email:	Chilinski.jim@sika.corp.com
Contact Name:	Jim Chilinski
Web:	http://www.sika.com
Supplier Name:	Master Builders, Inc.
Address:	23700 Chagrin Boulevard Cleveland, OH 44122
Telephone:	800-MBT-9990 or 216-831-5500
Fax:	216-831-6910
Email:	info@masterbuilders.com
Contact Name:	Sales
Web:	http://www.masterbuilders.com

A.12 COATINGS

Supplier Name:	Carboline Company
Address:	*350 Hanley Industrial Court, St. Louis, MO 63144-1599*
Telephone:	*314-644-1000*
Fax:	*314-644-4617*
Email:	*carbolineUSA@carboline.com*
Contact Name:	*Sales Department*
Web:	*www.carboline.com*
	Carboline Company Distributor in Mexico:
Supplier Name:	*Ston-Cor Mexico*
Address:	*Av. Vasconcelos No. 152 INT2C, Col. Santa Eugracia, San Pedro Garza Garcia, NL 66260, Mexico*
Telephone:	*528-363-6025*
Fax:	*528-363-6024*
Email:	*mexico@stoncor.com*
Contact Name:	*Sales*
Web:	
Supplier Name:	*Ameron International*
Address:	*13010 Morris Road, Suite 400, Alpharetta, GA 30004*
Telephone:	*800-926-3766*
Fax:	*678-566-2698*
Email:	*markrting@amerocoatings.com*
Contact Name:	*Marketing*
Web:	www.ameroncoatings.com

A.12 COATINGS, CONT.

Supplier Name:	*The Sherwin – Williams Company, International Division*
Address:	*Miami, Florida*
Telephone:	*305-819-5658*
Fax:	*305-821-9129*
Email:	*Juan.r.peraza@sherwin.com*
Contact Name:	*Juan R. Peraza*
Web:	*www.sherwin-williams.com*
Supplier Name:	*Industrial Coating Enterprises, Inc.*
Address:	*884 Forest Hills Road, Heath, Ohio, 43056*
Telephone:	*740-398-6190*
Fax:	*740-323-3369*
Email:	*sales@indcoatings.com*
Contact Name:	*Sales*
Web:	*www.indcoatings.com*

A.13 DRILLED SHAFTS

Supplier Name:	*A.H. Beck Foundation Company, Inc.*
Address:	*5123 Blanco Road, San Antonio, TX 78216-7005*
Telephone:	*210-342-5261*
Fax:	*210-342-4965*
Email:	*ahbeck@ahbeck.com*
Contact Name:	*A.H. Beck III, President, B.N. Langford, Vice President*
Web:	*www.ahbeck.com*
Supplier Name:	*Case Atlantic Company*
Address:	*13065 40th Street North, Clearwater, FL 33762*
Telephone:	*727-572-7740*
Fax:	*727-571-1393*
Email:	*112016.3427@compuserve.com*
Contact Name:	*Nigel Osborn, President, Larry Blough, Vice President*
Web:	*www.casefoundation.com*
Supplier Name:	*Treviicos Corp., South*
Address:	*3000 Gulf To Bay Blvd. Suite 205, Clearwater, FL 33759*
Telephone:	*727-723-0322*
Fax:	*727-723-3661*
Email:	*bkouri@treviicos.com*
Contact Name:	*Bud Khouri, Area Mgr*
Web:	

A.13 DRILLED SHAFTS (cont.)

Supplier Name:	Mc Kinney Drilling Company
Address:	P.O. Box 631000, Nacogdoches, TX 75963-1000
Telephone:	936-560-1000
Fax:	936-560-4739
Email:	
Contact Name:	Robert C. Banks, President, Jack A. Raines, Vice President
Web:	
Supplier Name:	Texas Shafts, Inc.
Address:	P.O. Box 79218 Fort Worth, TX 76179-0218
Telephone:	817-439-2000
Fax:	817-439-2105
Email:	txshafts@swbell.net
Contact Name:	Ty Savage, President, Roger Pool, Vice President
Web:	
Supplier Name:	N.L. Schutte Foundation Drilling, Inc.
Address:	P.O. Box 541865 Dallas, TX 75354-1865
Telephone:	972-556-0330
Fax:	972-556-0968
Email:	nls@mindspring.com
Contact Name:	Clayton Stephens, VP, James Bailey, Chief Estimator
Web:	

A.14 LIGHT TOWERS

Supplier Name:	Holophane
Address:	214 Oakwood Ave, Newark, OH 43055
Telephone:	740-349-4436
Fax:	740-349-4438
Email:	
Contact Name:	International sales
Web:	www.holophane.com/inquiries.htm
Supplier Name:	Holophane, S.A. de C.V (Serving Colombia)
Address:	Km. 31 Carretera Mexico –Cuautitlan, 54900 Tultitlan, Edo. De Mexico
Telephone:	Office: + 52-5-872-7277, + 52-5-872-8000
Fax:	: + 52-5-872-3614
Email:	holopha@ibm.net
Contact Name:	Sales
Web:	holophan@holophane.com.mx
Supplier Name:	GE Supply
Address:	9100 Purdue Road, Suite 400, Indianapolis, IN 46268
Telephone:	800-243-7313
Fax:	317-554-3847
Email:	
Contact Name:	National Sales Center
Web:	www.gesupply.com
Supplier Name:	Cooper Lighting
Address:	400 Busse Road, Elk Grove Village, IL 60007
Telephone:	847-956-8400
Fax:	847-806-3860
Email:	
Contact Name:	International Sales, USA
Web:	www.cooperlighting.com

A.15 ELECTRICAL CONTROLS AND SUBSTATION

Supplier Name:	GE Supply
Address:	9100 Purdue Road, Suite 400, Indianapolis, IN 46268
Telephone:	800-243-7313
Fax:	317-554-3847
Email:	
Contact Name:	National Sales Center
Web:	www.gesupply.com
Supplier Name:	Cutler-Hammer US - Miami
Address:	7975 NW 154th Street, Suite 410, Miami Lakes, FL 33016
Telephone:	305-512-3200
Fax:	305-512-8079
Email:	
Contact Name:	
Web:	www.ch.cutler-hammer.com
Supplier Name:	Siemens Energy & Automation, Inc.
Address:	186 Wood Avenue South, Iselin, NJ 08830
Telephone:	732-603-5839
Fax:	732-906-3851
Email:	
Contact Name:	International Business Unit
Web:	www.sea.siemens.com

A.16 PIPING SYSTEMS

Supplier Name:	Puget Sound Pipe and Supply Company
Address:	7816 South 202nd Street, Kent, WA 98032
Telephone:	253-796-9350
Fax:	253-796-9355
Email:	r.new@pspipe.com
Contact Name:	Rich Newton
Web:	www.pugetpipe.com
Supplier Name:	Pacific Pipe Company
Address:	2000 Mandela Parkway, Oakland, CA 94607
Telephone:	510-452-0122
Fax:	510-763-7838
Email:	
Contact Name:	
Web:	www.pacificpipe.com
Supplier Name:	Kelly Pipe Co., LLC
Address:	11700 Bloomfield Avenue, P.O. Box 2827, Santa Fe Springs, CA 90670
Telephone:	562-868-0456
Fax:	562-863-4695
Email:	
Contact Name:	
Web:	http://www.kellypipe.com/

A.17 WELDING ELECTRODES

Supplier Name:	The Lincoln Electric Company Latin American Headquarters
Address:	Miami Lakes Commerce Center, 5715 NW 158th St, Hialeah, FL 33014
Telephone:	305-556-0142
Fax:	305-822-9129
Email:	Barbie_Sanchez@lincolnelectric.com Leo_Landers@lincolnelectric.com
Contact Name:	Barbie Sanchez Leo Landers
Web:	http://www.lincolnelectric.com/
Supplier Name:	J.W. Harris Co., Inc.
Address:	4501 Quality Place, Mason, OH 45040
Telephone:	800-733-4533 or 513-754-2000
Fax:	513-754-8700
Email:	Rwood@JWHarris.com
Contact Name:	Rhonda Wood
Web:	http://www.jwharris.com
Supplier Name:	Thermadyne Holdings Corporation
Address:	101 S. Hanley Road, St. Louis, MO 63105
Telephone:	314-721-5573
Fax:	314-746-2324
Email:	
Contact Name:	
Web:	http://www.thermadyne.com

A.18 STEEL PLATE

Supplier Name:	Bethlehem Steel Corporation Burns Harbor Facility
Address:	P.O. Box 248 Chesterton, IN 46304
Telephone:	219-787-4553
Fax:	219-787-2139
Email:	Dan.Farrell@bethsteel.com
Contact Name:	Dan Farrell
Web:	www.bethsteel.com
Supplier Name:	Oregon Steel Mills
Address:	14400 N. Rivergate Boulevard Portland, OR 97203
Telephone:	503-978-6095
Fax:	503-240-5777
Email:	
Contact Name:	Mike Buckentin
Web:	
Supplier Name:	United States Steel Plate Products
Address:	1 North Broadway MS-42A Gary, IN 46402
Telephone:	219-888-2181
Fax:	219-888-2241
Email:	tjcera@uss.com
Contact Name:	
Web:	

A.19 NAVIGATION AIDS AND BUOYS

Supplier Name:	Tideland Signal Corporation
Address:	P.O. Box 52430, Houston, TX 77052
Telephone:	800-231-2778 or 713-681-6101
Fax:	713-681-6233
Email:	samerica-sales@tidelandsignal.com
Contact Name:	
Web:	http://www.tidelandsignal.com/
Supplier Name:	Automatic Power, Inc.
Address:	P.O. Box 230738, Houston, TX 77223
Telephone:	713-228-5208 or 757-253-2817
Fax:	713-228-3717 or 757-220-8166
Email:	APIAtlantic@aol.com or sales@automaticpower.com
Contact Name:	Ira Krams
Web:	www.automaticpower.com

A.20 REBAR COUPLERS

Supplier Name:	ERICO Solon, United States
Address:	34600 Solon Road, Solon, Ohio 44139
Telephone:	440-248-0100
Fax:	440-248-0723
Email:	
Contact Name:	
Web:	www.erico.com
Supplier Name:	Bar-Lock (MBT) Coupler Systems
Address:	P.O. Box 28280, Bellingham, WA 98228
Telephone:	800-755-4888
Fax:	360-738-1887
Email:	sales@barlock.com
Contact Name:	
Web:	www.barlock.com

A.21 EPOXY ANCHORS

Supplier Name:	Five Star Products, Inc.
Address:	425 Stillson Road, Fairfield, CT 06430
Telephone:	203-336-7900
Fax:	203-336-7930
Email:	sales@fivestarproducts.com
Contact Name:	
Web:	www.fivestarproducts.com
Supplier Name:	ITW Ramset/Red Head
Address:	1300 North Michael Drive, Wood Dale, IL 60191
Telephone:	630-350-0370
Fax:	630-350-7985
Email:	postmaster@itw-ramset.com
Contact Name:	
Web:	www.ramset-redhead.com
Supplier Name:	Drillco National Group
Address:	P.O. Box 2182, Long Island City, NY 11102
Telephone:	800-391-0052 or 718-726-9801
Fax:	718-956-3759
Email:	info@drillcodevices.com
Contact Name:	
Web:	www.drillcogroup.com

A.22 PIPE PILES

Supplier Name:	Florida Pipe and Steel, Inc.
Address:	13860 Wellington Trace#12, Suite 508, West Palm Beach, FL 33414
Telephone:	561-642-1811
Fax:	561-642-7431
Email:	Steel4sale@aol.com
Contact Name:	Vince Bianco
Web:	www.steel4sale.com
Supplier Name:	American Steel Pipe Division of American Cast Iron Pipe Company
Address:	1501 31st Avenue North, Birmingham, AL 35207
Telephone:	205-325-7744
Fax:	205-325-8194
Email:	Jon Noland
Contact Name:	Sales
Web:	www.acipco.com/steel/

A.23 BULK MATERIAL HANDLING AND STORAGE

Supplier Name:	CHIEF Industries, Inc
Address:	Grand Island, NE 68802
Telephone:	Tel 1-308 238 2737
Fax:	Fax 1-308 237 2650
Email:	agri@chiefind.com
Contact Name:	Mr. Oscar Coello
Web:	http://www.chiefind.com
Products:	Belt and chain conveyors, Bucket elevators, silos
Supplier Name:	Fuller Bulk Handling / FL Smidth
Address:	3942 West Old Highway 30 Bethlehem, PA 18016
Telephone:	Tel 1-610 264 6408
Fax:	Fax 1-610 264 6400
Email:	michael.gregory@flsmidth.com
Contact Name:	Contact: Michael Gregory
Web:	http://www.fullerbulkhandling.com
Products:	Mechanical unloaders (continuous or clamshell), bucket elevators

Supplier Name:	Heyl & Patterson
Address:	P O Box 2078 Pittsburgh, PA 15230
Telephone:	724 743 1000
Fax:	724 743 2850
Email:	info@heylpatterson.com
Contact Name:	Jerry Spehar
Web:	http://www.heylpatterson.com
Products:	Mechanical unloaders (continuous or clamshell)

Supplier Name:	*ThyssenKrupp Robins, Inc.*
Address:	*7730 E. Belleview Ave., # 404, Greenwood Village, Colorado 80111*
Telephone:	*303 770 0808*
Fax:	*303 770 8233*
Email:	*kri@krupprobins.com*
Contact Name:	*Mike Wilton-Clark*
Web:	*http://www.krupprobins.com*
Products:	*Complete bulk handling systems, mechanical unloaders (continuous or clamshell), belt and chain conveyors, bucket elevators*

Supplier Name:	*METSO Minerals Materials Handling*
Address:	*Canonsburg, PA 15317*
Telephone:	*1-412 269 5000*
Fax:	*1-412 269 5030*
Email:	*tim.sexton@metso.com*
Contact Name:	*Mr. Thimothy Sexton*
Web:	*http://www.metso.com*
Products:	*Complete handling systems, mechanical unloaders (continuous or clamshell), belt and chain conveyors, bucket elevators*

Supplier Name:	*Roberts & Schaefer Company*
Address:	*120 S. Riverside Plaza, Suite 400* *Chicago, IL 60606*
Telephone:	*1-312 236 7292*
Fax:	*1- 312 726 2872*
Email:	*bobw@eni.com*
Contact Name:	*Robert Williams*
Web:	*http://www.r-s.com*
Products:	*Complete materials handling systems, belt and chain conveyors, bucket elevators, silos*
Supplier Name:	*SCAFCO Corporation; Grain Systems*
Address:	*PO BOX 11215* *6200 E. Main Avenue* *Spokane, WA 99211-1215*
Telephone:	*1-509-535-1571*
Fax:	*1-509-535- 9130*
Email:	*mail@scafco.com*
Contact Name:	
Web:	*http://www.scafco.com*
Products:	*Belt and chain conveyors, bucket elevators, silos*

Supplier Name:	EDC, Inc.
Address:	67 Ramapo Rd. Mahwah NJ 07430
Telephone:	Tel 1-201-684-1220
Fax:	
Email:	info@edcincorp.com
Contact Name:	Walter Herbst, Sr.
Web:	http://www.edcincorp.com
Products:	Materials handling
Supplier Name:	Continental Conveyor & Equipment Co., Inc.
Address:	P.O. Box 400 438 Industrial Drive Winfield AL 35594
Telephone:	Tel 1-205-487-6492
Fax:	Fax 1-205) 487-4233
Email:	
Contact Name:	
Web:	http://www.continentalconveyor.com
Products:	Conveyors

Supplier Name:	FMC Corp.
Address:	Conveyor Equipment Division 1 Link Belt Dr Tapelo MS 38802
Telephone:	Tel 1-662-869-5711
Fax:	FAX: 662 869 7402
Email:	
Contact Name:	
Web:	http://www.fmcconveyors.com

Supplier Name:	Hendrik Enterprises, Inc.
Address:	103 Sprain Brook Rd, Woodbury CT 06798
Telephone:	1-203-263-7025
Fax:	1-203-263-7425
Email:	
Contact Name:	Mr. Henk Hartsuiker
Web:	http://www.hendrikent.com

A.24 MARINE TERMINAL PLANNING AND ENGINEERING

Supplier Name:	DMJM Harris
Address:	20 Exchange Pl 12th Fl
Telephone:	1-212-701-2868
Fax:	1-212-701-2801
Email:	Abbas.sarmad@dmjmharris.com
Contact Name:	Abbas Sarmad, P.E.
Web:	http://www.dmjmharris.com
Supplier Name:	Moffatt & Nichol
Address:	320 Golden Shore Suite 300 Long Beach, CA 90802
Telephone:	1 (562) 590-6500
Fax:	1 (562) 590-6512
Email:	
Contact Name:	Michael Horton
Web:	http://www.moffattnichol.com

A.25 DREDGING CONTRACTORS

Supplier Name:	Great Lakes Dredge & Dock Company Great Lakes Dredging
Address:	2122 York Road Oak Brook, IL 60523 USA
Telephone:	Phone 630/574-3000
Fax:	Fax 630/574-2909
Email:	
Contact Name:	International Division
Web:	http://www.gldd.com
Supplier Name:	Weeks Marine, Inc.
Address:	4 Commerce Drive Cranford, NJ 07016-3598 Dredging Division – Gulf Coast Office 304 Gaille Drive Innwoods Business Park Covington, LA 70433
Telephone:	Phone: 985-875-2500
Fax:	Fax: 985-875-2570
Email:	Email: dredging@weeksmarine.com
Contact Name:	Brion Lindholm, Senior Vice President Eric Ellefsen, Vice President Business Manager
Web:	

Supplier Name:	Bean Stuyvesant, LLC
Address:	1055 St. Charles Ave. Suite 520 New Orleans, LA 70130
Telephone:	Phone: 504-587-8701
Fax:	Fax: 504-587-8717
Email:	Email: ataylor@cfbean.com
Contact Name:	Jim Bean, CEO Ancil Taylor, Vice President
Web:	Website: www.cfbean.com
Supplier Name:	Dredge America, Inc.
Address:	9555 NW Highway N Kansas City, MO 64153
Telephone:	Phone: 816-330-3100
Fax:	Fax: 816-330-3103
Email:	Email: dan@dredgeamerica.com
Contact Name:	Website: www.dredgeamerica.com
Web:	Dan McDougal, President

Supplier Name:	*Gahagan and Bryant Associates, Inc. – Engineering of Dredging*
Address:	*3802 W. Bay to Bay Blvd. #B-22* *Tampa, FL 33629*
Telephone:	*Phone: 813-831-4408*
Fax:	*Fax: 813-831-4216*
Email:	*Email: jfbryant@gba-inc.com* *cmbryant@gba-inc.com* *gbryant@gba-inc.com*
Contact Name:	*J. Frank Bryant, President* *Clay Bryant, Vice President* *Grady Bryant, Vice President*
Web:	*Website: www.gba-inc.com*

A.26 COMPUTER MANUFACTURERS

Supplier Name:	*Dell Inc.*
Address:	*One Dell Way* *Round Rock, Texas 78682 USA*
Telephone:	*800-433-9014*
Fax:	
Email:	
Contact Name:	
Web:	*www1.us.dell.com*

Supplier Name:	*Hewlett Packard (Latin America)*
Address:	*Waterford Building, 9th Floor* *5200 Blue Lagoon Drive* *Miami, FL 33126 USA*
Telephone:	*305-267-4220*
Fax:	*305-265-5550*
Email:	
Contact Name:	
Web:	*www.hp.com*

Supplier Name:	*IBM Corporation*
Address:	*1133 Westchester Avenue* *White Plains, NY 10604 USA*
Telephone:	*800-426-4968*
Fax:	
Email:	
Contact Name:	
Web:	*www.ibm.com/products/us*

Supplier Name:	*Psion Teklogix*
Address:	*1810 Airport Exchange Blvd., Suite 500* *Erlanger, KY 41018 USA*
Telephone:	*800-322-3437*
Fax:	
Email:	
Contact Name:	
Web:	*www.psionteklogix.com*

Supplier Name:	Symbol Technologies, Inc(Latin Amer HQ)
Address:	2730 University Drive Coral Springs, FL 33065 USA
Telephone:	954-255-2610
Fax:	954-340-9454
Email:	
Contact Name:	
Web:	www.symbol.com

A.27 FINANCIAL SOFTWARE

Supplier Name:	Great Plains(Microsoft Business Solutions)
Address:	One Lone Tree Road Fargo, ND 58104-3911 USA
Telephone:	
Fax:	
Email:	
Contact Name:	
Web:	www.microsoft.com

Supplier Name:	J. D. Edwards (Oracle Corp)
Address:	500 Oracle Parkway Redwood Shores, CA 94065
Telephone:	800-ORACLE1
Fax:	
Email:	
Contact Name:	
Web:	www.oracle.com

Supplier Name:	Lawson Software
Address:	380 St. Peter Street St. Paul, MN 55102-1302
Telephone:	651-767-7000
Fax:	
Email:	
Contact Name:	
Web:	www.lawson.com

Supplier Name:	PeopleSoft (Oracle)
Address:	500 Oracle Parkway Redwood Shores, CA 94065
Telephone:	800-633-0925
Fax:	
Email:	Oracle@oracle.com
Contact Name:	
Web:	www.oracle.com

Supplier Name:	Softbrands
Address:	Two Meridian Crossings, Suite 800 Minneapolis, MN 55423 USA
Telephone:	612-851-1500
Fax:	612-851-1560
Email:	Info@softbrands.com
Contact Name:	
Web:	www.softbrands.com

Supplier Name:	SSA Global
Address:	500 West Madison Street, Suite 1600 Chicago, Illinois 60661 USA
Telephone:	312-258-6000
Fax:	312-474-7500
Email:	
Contact Name:	
Web:	www.ssax.com

A.28 MAINTENANCE SOFTWARE

Supplier Name:	Datastream
Address:	50 Datastream Plaza Greenville, SC 29605-3451
Telephone:	864-422-5001
Fax:	864-422-5000
Email:	
Contact Name:	John M. Sterling III
Web:	www.datastream.net

Supplier Name:	EAM (formerly MainTracker from SSA) LookSoftware, Inc.
Address:	5011 Cherry Lane Mohnton, PA 19540 USA
Telephone:	610-685-look
Fax:	610-685-5669
Email:	Info@looksoftware.com
Contact Name:	
Web:	www.looksoftware.com

Supplier Name:	Spear Technologies
Address:	436 – 14th Street, Suite 200 Oakland, CA 94612 USA
Telephone:	510-267-3333
Fax:	519-267-3344
Email:	Sales@speartechnologies.com
Contact Name:	
Web:	www.speartechnologies.com

A.29 POWER SYSTEMS

Supplier Name:	American Power Conversion Corp. (APC)
Address:	1332 Fairgrounds Road W. Kingston, RI 02892 USA
Telephone:	877-272-2722
Fax:	
Email:	
Contact Name:	
Web:	www.apc.com

Supplier Name:	Eaton Corporation
Address:	Eaton Center 1111 Superior Avenue Cleveland, OH 44114-2584
Telephone:	
Fax:	
Email:	
Contact Name:	
Web:	www.eaton.com

Supplier Name:	Liebert Corporation
Address:	1050 Dearborn Drive Columbus, OH 43229
Telephone:	614-888-0246
Fax:	614-841-6022
Email:	Info@liebert.com
Contact Name:	
Web:	www.liebert.com

A.30 TERMINAL OPERATING SYSTEMS SOFTWARE

Supplier Name:	Embarcadero Systems Corporation
Address:	1701 Harbor Bay Parkway Alameda, California 94502
Telephone:	510-749-7400
Fax:	510-749-3800
Email:	Info@esystem.com
Contact Name:	Eastern US, Pacific Northwest, Southern California, Southeastern US
Web:	www.embarcadero.com

Supplier Name:	Maher Terminal Logistics Systems, Inc.
Address:	Four Connell Drive Berkeley Heights, NJ 07922
Telephone:	908-665-2100
Fax:	908-790-5676
Email:	Coleman@mtls.com
Contact Name:	George E. Coleman
Web:	www.mtls.com

Supplier Name:	Navis LLC
Address:	1000 Broadway, Suite 1500 Oakland, CA 94607, USA
Telephone:	510-267-5000
Fax:	510-267-5100
Email:	Mbardi@navis.com
Contact Name:	Martin Bardi
Web:	www.navis.com/home.jsp

Supplier Name:	Tideworks Technology
Address:	1129 SW Klickitat Way Seattle, Washington 98134
Telephone:	206-382-4470
Fax:	206-382-0443
Email:	Info@tideworks.com
Contact Name:	Sales@tideworks.com
Web:	www.tideworks.com

A.31 Fire Protection and Suppression Systems

Supplier Name:	Hiller Systems
Address:	833 Principal Lane, Chesapeake, VA. 23320
Telephone:	757-549-1083
Email:	Hillersystemsinc.com

Supplier Name:	Koetter Fire Protection
Address:	10351 Olympic Drive, Dallas Texas, 75220
Telephone:	214-358-3593
Email:	Koetterfire.com

Supplier Name:	SimplexGrinnell
Address:	5449 Bear Lane, Corpus Christi, Texas, 78405
Telephone:	361-289-6174
Email:	Simplexgrinnell.com

A.32 Fire Apparatus

Supplier Name:	Singer Associates
Address:	7394 Gallerher Road, Gainsville, VA. 20155
Telephone:	800-442-9700
Email:	Singerfire.com

Supplier Name:	Seagrave Apparartus
Address:	105 East 12th Street, Clintonville, WI 54929
Telephone:	715-823-2141
Email:	Seagrave.com

Supplier Name:	American LaFrance
Address:	8500 Palmetto Commerce Parkway, Ladson, SC 29456
Telephone:	888-253-8725
Email:	Americanlafrance.com

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VERACRUZ

BULK MATERIAL HANDLING CONSULTING
PORT DEVELOPMENT • CARGO HANDLING SYSTEMS • OFFSHORE TERMINALS

June 17, 2005
by: K.Kroeter

USTDA - Veracruz Terminal Expansion Study

ALTERNATIVE A

BUDGET SUMMARY of Grain Import Activities

Budget Accuracy ±20%

TERMINAL AND BERTH OPERATION BASE PROPOSAL	Unloading Equipment	Storage x 1000 tons	Annual throughput mill.tons LOW	Annual throughput mill.tons HIGH	Handling Equipment Budget Cost	TERMINAL AND BERTH OPERATION TMV - ALTERNATIVE	Unloading Equipment	Storage x 1000 tons	Annual throughput mill.tons LOW	Annual throughput mill.tons HIGH	Handling Equipment Budget Cost
CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-	CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-
BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers		1.80	1.84	-	BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers		1.80	1.84	-
BERTH No. 4N EXISTING OPERATION	Truck Hoppers	96	1.35	1.38	-	BERTH No. 4N EXISTING OPERATION	Truck Hoppers	96	1.35	1.38	-
BERTH No. 4S EXISTING OPERATION	Truck Hoppers		1.35	1.38	-	BERTH No. 4S EXISTING OPERATION	Truck Hoppers		1.35	1.38	-
EXISTING TERMINAL TOTAL AT 65% OCCUPANCY		**146**	**6.10**	**6.30**	-	***EXISTING TERMINAL TOTAL AT 65% OCCUPANCY***		***146***	***6.10***	***6.30***	-
CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-	CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-
UPGRADING of CARGILL TERMINAL	1x500t/h Mech.Unl.	10	1.20	1.30	$10,400,000	NEM TMV BERTH	1,000t/h conv.system	62	2.00	2.00	$5,000,000
BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers		1.80	1.84	-	BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers		1.80	1.84	[indicated by TMV]
INITIAL UPGRADING of BERTH No.5N	4 Mobile Hoppers	96	1.80	1.84	$4,400,000	Berth No.4N OPERATION moved to Berth No.5N	Truck Hoppers	96	1.35	1.38	-
Berth No.4S OPERATION moved toBerth No.5S	Truck Hoppers		1.35	1.38	-	Berth No.4S OPERATION moved toBerth No.5S	Truck Hoppers		1.35	1.38	-
INTERMEDIATE STEP TOTAL		**156**	**7.75**	**8.06**	**$14,800,000**	**INTERMEDIATE STEP TOTAL**		**208**	**8.10**	**8.30**	**$5,000,000**
INTERMEDIATE STEP ADDITION		***10***	***1.65***	***1.76***	***$14,800,000***	***INTERMEDIATE STEP ADDITION***		***62***	***2.00***	***2.00***	***$5,000,000***
CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-	UPGRADING of CARGILL TERMINAL	3x500t/h Pn.Unl.	60	2.80	3.00	$10,400,000
UPGRADING of CARGILL TERMINAL	1x500t/h Mech.Unl.	10	1.20	1.30	$10,400,000	NEM TMV BERTH	1,000t/h conv.system	62	2.00	2.00	$5,000,000
BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers	96	1.80	1.84	-	BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers	96	1.80	1.84	[indicated by TMV]
FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	44	3.60	3.90	$27,000,000	INITIAL UPGRADING of BERTH No. 5N	4 Mobile Hoppers	5	1.80	1.84	$4,400,000
Berth No.4S OPERATION moved toBerth No.5S	Truck Hoppers	-	1.35	1.38	-	INITIAL UPGRADING of BERTH No. 5S	4 Mobile Hoppers	5	1.80	1.84	$4,400,000
FIRST STEP TOTAL		**200**	**9.55**	**10.12**	**$37,400,000**	**FIRST STEP TOTAL**		**228**	**10.20**	**10.52**	**$24,200,000**
FIRST STEP ADDITION		***44***	***1.80***	***2.06***	***$22,600,000***	***FIRST STEP ADDITION***		***20***	***2.10***	***2.22***	***$19,200,000***
CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-	UPGRADING of CARGILL TERMINAL	3x500t/h Pn.Unl.	60	2.80	3.00	$10,400,000
UPGRADING of CARGILL TERMINAL	1x500t/h Mech.Unl.	10	1.20	1.30	$10,400,000	NEM TMV BERTH	1,000t/h conv.system	62	2.00	2.00	$5,000,000
BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers	96	1.80	1.84	-	BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers	96	1.80	1.84	[indicated by TMV]
FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	44	3.60	3.90	$27,000,000	FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	49	3.60	3.90	$27,000,000
INITIAL UPGRADING of BERTH No. 5S	3x600t/h Mech.Unl.	45	3.60	3.90	$25,400,000	INITIAL UPGRADING of BERTH No. 5S	4 Mobile Hoppers	5	1.80	1.84	$4,400,000
SECOND STEP TOTAL		**245**	**11.80**	**12.64**	**$62,800,000**	**SECOND STEP TOTAL**		**272**	**12.00**	**12.58**	**$46,800,000**
SECOND STEP ADDITION		***45***	***2.25***	***2.52***	***$25,400,000***	***SECOND STEP ADDITION***		***44***	***1.80***	***2.06***	***$22,600,000***
CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-	UPGRADING of CARGILL TERMINAL	3x500t/h Pn.Unl.	60	2.80	3.00	$10,400,000
UPGRADING of CARGILL TERMINAL	1x500t/h Mech.Unl.	10	1.20	1.30	$10,400,000	NEM TMV BERTH	1,000t/h conv.system	62	2.00	2.00	$5,000,000
BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers	96	1.80	1.84	-	BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers	96	1.80	1.84	[indicated by TMV]
FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	44	3.60	3.90	$27,000,000	FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	49	3.60	3.90	$27,000,000
FINAL UPGRADING of BERTH No. 5S	5x600t/h Mech.Unl.	80	5.25	5.65	$44,100,000	INTERMEDIATE UPGRADING of BERTH No. 5S	3x600t/h Mech.Unl.	40	3.60	3.90	$29,800,000
THIRD STEP TOTAL		**280**	**13.45**	**14.39**	**$81,500,000**	**THIRD STEP TOTAL**		**307**	**13.80**	**14.64**	**$72,200,000**
THIRD STEP ADDITION		***35***	***1.65***	***1.75***	***$18,700,000***	***THIRD STEP ADDITION***		***35***	***1.80***	***2.06***	***$25,400,000***
CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-	UPGRADING of CARGILL TERMINAL	3x500t/h Pn.Unl.	60	2.80	3.00	$10,400,000
UPGRADING of CARGILL TERMINAL	1x500t/h Mech.Unl.	10	1.20	1.30	$10,400,000	NEM TMV BERTH	1,000t/h conv.system	62	2.00	2.00	$5,000,000
FINAL UPGRADING of BERTH No. 6S	3x500t/h Mech.Unl.	136	3.60	3.90	$21,900,000	FINAL UPGRADING of BERTH No. 6S	3x600t/h Mech.Unl.	136	3.60	3.90	$21,900,000
FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	44	3.60	3.90	$27,000,000	FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	49	3.60	3.90	$27,000,000
FINAL UPGRADING of BERTH No. 5S	5x600t/h Mech.Unl.	80	5.25	5.65	$44,100,000	FINAL UPGRADING of BERTH No. 5S	5x600t/h Mech.Unl.	45	5.25	5.65	$48,500,000
FOURTH STEP TOTAL		**320**	**15.25**	**16.45**	**$103,400,000**	**FOURTH STEP TOTAL**		**352**	**17.25**	**18.45**	**$112,800,000**
FOURTH STEP ADDITION		***40***	***1.80***	***2.06***	***$21,900,000***	***FOURTH STEP ADDITION***		***45***	***3.45***	***3.81***	***$40,600,000***
CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-	UPGRADING of CARGILL TERMINAL	3x500t/h Pn.Unl.	60	2.80	3.00	$10,400,000
UPGRADING of CARGILL TERMINAL	1x500t/h Mech.Unl.	10	1.20	1.30	$10,400,000	NEM TMV BERTH	1,000t/h conv.system	62	2.00	2.00	$5,000,000
FINAL UPGRADING of BERTH No. 6S	3x500t/h Mech.Unl.	136	3.60	3.90	$21,900,000	FINAL UPGRADING of BERTH No. 6S	3x500t/h Mech.Unl.	136	3.60	3.90	$21,900,000
FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	44	3.60	3.90	$27,000,000	FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	49	3.60	3.90	$27,000,000
FINAL UPGRADING of BERTH No. 5S	5x600t/h Mech.Unl.	80	5.25	5.65	$44,100,000	FINAL UPGRADING of BERTH No. 5S	5x600t/h Mech.Unl.	45	5.25	5.65	$48,500,000
NEW BERTH FACE AT NEW LOCATION	3x600t/h Mech.Unl.	112	5.15	5.25	$30,000,000	NEW BERTH FACE AT NEW LOCATION	3x600t/h Mech.Unl.	112	5.15	5.25	$30,000,000
FIFTH STEP TOTAL		**432**	**20.40**	**21.70**	**$133,400,000**	**FIFTH STEP TOTAL**		**464**	**22.40**	**23.70**	**$142,800,000**
FIFTH STEP ADDITION		***112***	***5.15***	***5.25***	***$30,000,000***	***FIFTH STEP ADDITION***		***112***	***5.15***	***5.25***	***$30,000,000***

BULK MATERIAL HANDLING CONSULTING
PORT DEVELOPMENT • CARGO HANDLING SYSTEMS • OFFSHORE TERMINALS

June 17, 2005
by: K.Kroeter

USTDA - Veracruz Terminal Expansion Study

ALTERNATIVE B

BUDGET SUMMARY of Grain Import Activities

Budget Accuracy ±20%

TERMINAL AND BERTH OPERATION BASE PROPOSAL	Unloading Equipment	Storage x 1000 tons	Annual throughput mill.tons		Handling Equipment Budget Cost	TERMINAL AND BERTH OPERATION TMV - ALTERNATIVE	Unloading Equipment	Storage x 1000 tons	Annual throughput mill.tons		Handling Equipment Budget Cost
			LOW	HIGH					LOW	HIGH	
CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-	CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-
BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers		1.80	1.84	-	BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers		1.80	1.84	-
BERTH No. 4N EXISTING OPERATION	Truck Hoppers	96	1.35	1.38	-	BERTH No. 4N EXISTING OPERATION	Truck Hoppers	96	1.35	1.38	-
BERTH No. 4S EXISTING OPERATION	Truck Hoppers		1.35	1.38	-	BERTH No. 4S EXISTING OPERATION	Truck Hoppers		1.35	1.38	-
EXISTING TERMINAL TOTAL AT 65% OCCUPANCY		**146**	**6.10**	**6.30**	-	**EXISTING TERMINAL TOTAL AT 65% OCCUPANCY**		**146**	**6.10**	**6.30**	-
CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-	CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-
UPGRADING of CARGILL TERMINAL	1x500t/h Mech.Unl.	10	1.20	1.30	$10,400,000	NEM TMV BERTH	1,000t/h conv.system	62	2.00	2.00	$5,000,000
BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers		1.80	1.84	-	BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers		1.80	1.84	[indicated by TMV]
INITIAL UPGRADING of BERTH No.5N	4 Mobile Hoppers	96	1.80	1.84	$4,400,000	Berth No.4N OPERATION moved to Berth No.5N	Truck Hoppers	96	1.35	1.38	-
Berth No.4S OPERATION moved toBerth No.5S	*Truck Hoppers*		1.35	1.38	-	*Berth No.4S OPERATION moved toBerth No.5S*	*Truck Hoppers*		1.35	1.38	-
INTERMEDIATE STEP TOTAL		**156**	**7.75**	**8.06**	**$14,800,000**	**INTERMEDIATE STEP TOTAL**		**208**	**8.10**	**8.30**	**$5,000,000**
INTERMEDIATE STEP ADDITION		***10***	***1.65***	***1.76***	***$14,800,000***	***INTERMEDIATE STEP ADDITION***		***62***	***2.00***	***2.00***	***$5,000,000***
CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-	UPGRADING of CARGILL TERMINAL	3x500t/h Pn.Unl.	60	2.80	3.00	$10,400,000
UPGRADING of CARGILL TERMINAL	1x500t/h Mech.Unl.	10	1.20	1.30	$10,400,000	NEM TMV BERTH	1,000t/h conv.system	62	2.00	2.00	$5,000,000
BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers	96	1.80	1.84	-	BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers	96	1.80	1.84	[indicated by TMV]
FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	44	3.60	3.90	$27,000,000	INITIAL PGRADING of BERTH No. 5N	4 Mobile Hoppers	5	1.80	1.84	$4,400,000
Berth No.4S OPERATION moved toBerth No.5S	Truck Hoppers	-	1.35	1.38	-	INITIAL UPGRADING of BERTH No. 5S	4 Mobile Hoppers	5	1.80	1.84	$4,400,000
FIRST STEP TOTAL		**200**	**9.55**	**10.12**	**$37,400,000**	**FIRST STEP TOTAL**		**228**	**10.20**	**10.52**	**$24,200,000**
FIRST STEP ADDITION		***44***	***1.80***	***2.06***	***$22,600,000***	***FIRST STEP ADDITION***		***20***	***2.10***	***2.22***	***$19,200,000***
CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-	UPGRADING of CARGILL TERMINAL	3x500t/h Pn.Unl.	60	2.80	3.00	$10,400,000
UPGRADING of CARGILL TERMINAL	1x500t/h Mech.Unl.	10	1.20	1.30	$10,400,000	NEM TMV BERTH	1,000t/h conv.system	62	2.00	2.00	$5,000,000
BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers	96	1.80	1.84	-	BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers	96	1.80	1.84	[indicated by TMV]
FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	44	3.60	3.90	$27,000,000	FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	49	3.60	3.90	$27,000,000
INITIAL UPGRADING of BERTH No. 5S	*3x600t/h Mech.Unl.*	45	3.60	3.90	$25,400,000	INITIAL UPGRADING of BERTH No. 5S	4 Mobile Hoppers	5	1.80	1.84	$4,400,000
SECOND STEP TOTAL		**245**	**11.80**	**12.64**	**$62,800,000**	**SECOND STEP TOTAL**		**272**	**12.00**	**12.58**	**$46,800,000**
SECOND STEP ADDITION		***45***	***2.25***	***2.52***	***$25,400,000***	***SECOND STEP ADDITION***		***44***	***1.80***	***2.06***	***$22,600,000***
CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-	UPGRADING of CARGILL TERMINAL	3x500t/h Pn.Unl.	60	2.80	3.00	$10,400,000
UPGRADING of CARGILL TERMINAL	1x500t/h Mech.Unl.	10	1.20	1.30	$10,400,000	NEM TMV BERTH	1,000t/h conv.system	62	2.00	2.00	$5,000,000
BERTH No. 6S EXISTING OPERATION	4 Mobile Hoppers	96	1.80	1.84	-	*BERTH No. 6S EXISTING OPERATION*	*4 Mobile Hoppers*	*96*	*1.80*	*1.84*	*[indicated by TMV]*
FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	44	3.60	3.90	$27,000,000	FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	49	3.60	3.90	$27,000,000
FINAL UPGRADING of BERTH No. 5S	5x600t/h Mech.Unl.	80	5.25	5.65	$44,100,000	INTERMEDIATE UPGRADING of BERTH No. 5S	3x600t/h Mech.Unl.	40	3.60	3.90	$29,800,000
THIRD STEP TOTAL		**280**	**13.45**	**14.39**	**$81,500,000**	**THIRD STEP TOTAL**		**307**	**13.80**	**14.64**	**$72,200,000**
THIRD STEP ADDITION		***35***	***1.65***	***1.75***	***$18,700,000***	***THIRD STEP ADDITION***		***35***	***1.80***	***2.06***	***$25,400,000***
CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-	UPGRADING of CARGILL TERMINAL	3x500t/h Pn.Unl.	60	2.80	3.00	$10,400,000
UPGRADING of CARGILL TERMINAL	1x500t/h Mech.Unl.	10	1.20	1.30	$10,400,000	NEM TMV BERTH	1,000t/h conv.system	62	2.00	2.00	$5,000,000
FINAL UPGRADING of BERTH No. 6S	3x500t/h Mech.Unl.	136	3.60	3.90	$21,900,000	FINAL UPGRADING of BERTH No. 6S	3x500t/h Mech.Unl.	136	3.60	3.90	$21,900,000
FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	44	3.60	3.90	$27,000,000	FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	49	3.60	3.90	$27,000,000
FINAL UPGRADING of BERTH No. 5S	5x600t/h Mech.Unl.	80	5.25	5.65	$44,100,000	FINAL UPGRADING of BERTH No. 5S	5x600t/h Mech.Unl.	45	5.25	5.65	$48,500,000
FOURTH STEP TOTAL		**320**	**15.25**	**16.45**	**$103,400,000**	**FOURTH STEP TOTAL**		**352**	**17.25**	**18.45**	**$112,800,000**
FOURTH STEP ADDITION		***40***	***1.80***	***2.06***	***$21,900,000***	***FOURTH STEP ADDITION***		***45***	***3.45***	***3.81***	***$40,600,000***
CARGILL TERMINAL EXISTING OPERATION	2x500t/h Pn.Unl.	50	1.60	1.70	-	UPGRADING of CARGILL TERMINAL	3x500t/h Pn.Unl.	60	2.80	3.00	$10,400,000
UPGRADING of CARGILL TERMINAL	1x500t/h Mech.Unl.	10	1.20	1.30	$10,400,000	NEM TMV BERTH	1,000t/h conv.system	62	2.00	2.00	$5,000,000
FINAL UPGRADING of BERTH No. 6S	*3x500t/h Mech.Unl.*	*136*	*3.60*	*3.90*	*$21,900,000*	*FINAL UPGRADING of BERTH No. 6S*	*3x500t/h Mech.Unl.*	136	3.60	3.90	$21,900,000
FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	44	3.60	3.90	$27,000,000	FINAL UPGRADING of BERTH No. 5N	3x600t/h Mech.Unl.	49	3.60	3.90	$27,000,000
FINAL UPGRADING of BERTH No. 5S	5x600t/h Mech.Unl.	80	5.25	5.65	$44,100,000	FINAL UPGRADING of BERTH No. 5S	5x600t/h Mech.Unl.	45	5.25	5.65	$48,500,000
NEW BERTH FACES AT NEW LOCATION	3x600t/h Mech.Unl.	75	3.60	3.90	$26,200,000	NEW BERTH FACE AT NEW LOCATION	3x600t/h Mech.Unl.	75	3.60	3.90	$26,200,000
NEW BERTH FACES AT NEW LOCATION	3x600t/h Mech.Unl.	75	3.60	3.90	$26,200,000	NEW BERTH FACE AT NEW LOCATION	3x600t/h Mech.Unl.	75	3.60	3.90	$26,200,000
FIFTH STEP TOTAL		***470***	***22.45***	***24.25***	***$155,800,000***	**FIFTH STEP TOTAL**		***502***	***24.45***	***26.25***	***$165,200,000***
FIFTH STEP ADDITION		***150***	***7.20***	***7.80***	***$52,400,000***	***FIFTH STEP ADDITION***		***150***	***7.20***	***7.80***	***$52,400,000***

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Table No. B-S1 BUDGET COST ESTIMATE SUMMARY

UPGRADING of CARGILL TERMINAL 1x500 t/h unloader-11,000t storage

ITEM LIST	No	Conv. Width m	Conv. Length m	Conv. Capacity m.tph	Inst. kW	Inst.Wt. tons	Budget Cost US $	REMARKS Accuracy±20%
Belt Conveyor at Berth	C1	1.0	200	600	40	120	$550,000	
Belt Conveyor to Storage	C2	1.0	300	600	50	150	$690,000	
Belt Conveyor to Storage	C3	1.0	200	600	40	120	$550,000	
Continuous Unloader	1			500	300	300	$3,500,000	Nominal 600t/h
Chain Conveyors (20m)	4		20	600	80	12	$120,000	Avg.cost per m: $1,500
Chain Conveyors (30m)	1		30	600	20	5	$50,000	Avg.wt. tons/m: 0.150
Bucket Elevators (40m)	1	H=	40	600	100	6	$60,000	
Bucket Elevators (25m)	1	H=	25	600	75	4	$40,000	
Bucket Elevators (18m)	1	H=	18	600	55	3	$30,000	
Chutes, spouts, valves	CH				10	15	$50,000	
Transfer Station C1/C2	TS1				8	40	$100,000	
Transfer Station C2/C3	TS2				8	40	$100,000	
Central Weighing Tower	TSW				10	25	$250,000	
Transfer structures for chain conv's	TC				25	30	$120,000	
Bulk batch weighing system	BW				5	10	$160,000	
5500 t Silos w.aeration & sweeps	2	20m dia x 25m OA height			40	140	$300,000	
Silo unloading chain feeders (10m)	2		10	600	30	3	$30,000	
Magnets	2				10	4	$40,000	
Truck loading system for Grain	TLG			600	30	10	$100,000	
Railcar loading system for Grain	RLG			600	50	20	$200,000	
Truck Scales in/out	2				2	20	$80,000	
						Totl.tons		
				Misc.Utilities	49	1,077	$7,120,000	
Electric Equipment, MCC's, power distribution, controls, lighting, grounding					1,040 kW total		$890,000	
(1) Wheel Loader for vessel clean out							$0	Existing
Mobile Maintenance Equipment							$0	Existing
			SUBTOTAL 1				$8,010,000	
Spare Parts percentage of SUBTOTAL 1:						5.0%	$400,000	
Civils: Conveyor and Transfers Foundations							$360,000	
Civil Work on Land for Silos							$220,000	see details below
CIVILS: Marine works -							$0	by others
			SUBTOTAL 2				$8,990,000	
Engineering percentage of SUBTOTAL 2:						5.0%	$450,000	
			SUBTOTAL 3				$9,440,000	
Contingencies percentage of SUBTOTAL 3:						10.0%	$940,000	
			GRAND TOTAL			rounded	$10,400,000	

Civil Cost			Unit Cost			Item Cost	Remarks
Site Preparation 50 x 80 m	4,000	m²	$10			$40,000	
Soil Cement for 2 silos	800	m²	$25			$20,000	
Tunnels under silos	40	m	$4,000			$160,000	
			Total Civil Cost:			$220,000	entered above

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Table No. B-S2 BUDGET COST ESTIMATE SUMMARY

INTERMEDIATE UPGRADING of BERTH No.5N or 5S

4 mobile hoppers+conveyors

ITEM LIST	No	Conv. Width m	Conv. Length m	Conv. Capacity m.tph	Inst. kW	Inst.Wt. tons	Budget Cost US $	REMARKS Accuracy±20%
Belt Conveyor at Berth	C1	1.6	300	1,800	110	210	$980,000	
Belt Conveyor to Storage	C2	1.6	100	1,800	75	100	$490,000	
Belt Conveyor to Storage	C3	1.6	200	1,800	90	170	$790,000	
Mobile Hopper/Feeder for SU Ships	4			4 x 250	100	40	$400,000	Upgrading existing hoppers
Transfer Station C1/C2	TS1				8	40	$100,000	
Transfer Station C2/C3	TS2				8	40	$100,000	
						Totl.tons		
				Misc.Utilities	21	390	$2,860,000	
Electric Equipment, MCC's, power distribution, controls, lighting, grounding					410 kW total		$510,000	
(1) Wheel Loader for vessel clean out							$0	Existing
Mobile Maintenance Equipment							$0	Existing
			SUBTOTAL 1				$3,370,000	
Spare Parts percentage of SUBTOTAL 1:						5.0%	$170,000	
Civils: Conveyor and Transfers Foundations							$250,000	
Civil Work on Land for Silos							$0	
CIVILS: Marine works - Rails for mobile hoppers							$0	by others
			SUBTOTAL 2				$3,790,000	
Engineering percentage of SUBTOTAL 2:						5.0%	$190,000	
			SUBTOTAL 3				$3,980,000	
Contingencies percentage of SUBTOTAL 3:						10.0%	$400,000	
			GRAND TOTAL			rounded	$4,400,000	

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Table No. B-S3 BUDGET COST ESTIMATE SUMMARY

FINAL UPGRADING of BERTH No. 5N 3x600 t/h unloaders-44,000t storage

ITEM LIST	No	Conv. Width m	Conv. Length m	Conv. Capacity m.tph	Inst. kW	Inst.Wt. tons	Budget Cost US $	REMARKS Accuracy±20%
Belt Conveyor at Berth	C1	1.6	300	1,800	110	210	$980,000	
Belt Conveyor to Storage	C2	1.6	100	1,800	75	100	$490,000	
Belt Conveyor to Storage	C3	1.6	200	1,800	90	170	$790,000	
Mobile Hopper/Feeder for SU Ships	4	1.6	200	1,600	100	40	$400,000	Upgrading existing hoppers
Continuous Unloaders	3			3 x 600	900	900	$12,000,000	35m reach from berth ctr
Chain Conveyors (20m)	4		20	1,600	160	20	$200,000	Avg.cost per m: $2,500
Chain Conveyors (60m)	3		60	1,600	150	45	$450,000	
Chain Conveyors (30m)	1		30	1,600	40	8	$80,000	Avg.wt. tons/m: 0.250
Bucket Elevators (40m)	1	H=	40	1,600	200	10	$100,000	
Bucket Elevators (25m)	1	H=	25	1,600	150	6	$60,000	
Bucket Elevators (18m)	1	H=	18	1,600	110	5	$50,000	
Chutes, spouts, valves	CH				10	30	$100,000	
Transfer Station C1/C2	TS1				8	40	$100,000	
Transfer Station C2/C3	TS2				8	40	$100,000	
Central Weighing Tower	TSW				10	25	$250,000	
Transfer towers for chain conv's	TC				25	30	$120,000	
Bulk batch weighing system	BW				5	10	$160,000	
5500 t Silos w.aeration & sweeps	8	20m dia x 25m OA height			160	560	$1,200,000	
Silo unloading chain feeders	8		10	1,000	240	20	$200,000	
Magnets	8				40	16	$160,000	
Truck loading system for Grain	TLG			800	60	20	$200,000	
Railcar loading system for Grain	RLG			1,600	100	50	$500,000	
Truck Scales in/out	2					20	$80,000	
						Totl.tons		
				Misc.Utilities	138	2,375	$18,770,000	
Electric Equipment, MCC's, power distribution, controls, lighting, groundinc					2,890 kW total		$2,140,000	
(1) Wheel Loader for vessel clean out							$0	Existing
Mobile Maintenance Equipment							$0	Existing
			SUBTOTAL 1				$20,910,000	
Spare Parts percentage of SUBTOTAL 1:						5.0%	$1,050,000	
Civils: Conveyor and Transfers Foundations							$640,000	
Civil Work on Land for Silos							$790,000	see details below
CIVILS: Marine works -							$0	by others
			SUBTOTAL 2				$23,390,000	
Engineering percentage of SUBTOTAL 2:						5.0%	$1,170,000	
			SUBTOTAL 3				$24,560,000	
Contingencies percentage of SUBTOTAL 3:						10.0%	$2,460,000	
			GRAND TOTAL			rounded	$27,000,000	

Civil Cost			Unit Cost			Item Cost	Remarks
Site Preparation 50 x 140 m	7,000	m²	$10			$70,000	
Soil Cement for 8 silos	3,200	m²	$25			$80,000	
Tunnels under silos	160	m	$4,000			$640,000	
			Total Civil Cost:			$790,000	entered above

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Table No. B-S4 BUDGET COST ESTIMATE SUMMARY

INITIAL or INTERMEDIATE UPGRADING of BERTH No. 5S 3x600 t/h unloaders-44,000t storage

ITEM LIST	No	Conv. Width m	Conv. Length m	Conv. Capacity m.tph	Inst. kW	Inst.Wt. tons	Budget Cost US $	REMARKS Accuracy±20%
Belt Conveyor at Berth	C1	1.6	400	1,800	130	270	$1,240,000	
Belt Conveyor to Storage	C2	1.6	100	1,800	75	100	$490,000	
Continuous Unloaders	3			3 x 600	900	900	$12,000,000	35m reach from berth ctr
Chain Conveyors (20m)	4		20	1,600	160	20	$200,000	Avg.cost per m: $2,500
Chain Conveyors (60m)	3		60	1,600	150	45	$450,000	
Chain Conveyors (30m)	1		30	1,600	40	8	$80,000	Avg.wt. tons/m: 0.250
Bucket Elevators (40m)	1	H=	40	1,600	200	10	$100,000	
Bucket Elevators (25m)	1	H=	25	1,600	150	6	$60,000	
Bucket Elevators (18m)	1	H=	18	1,600	110	5	$50,000	
Chutes, spouts, valves	CH				10	30	$100,000	
Transfer Station C1/C2	TS1				8	40	$100,000	
Central Weighing Tower	TSW				10	25	$250,000	
Transfer towers for chain conv's	TC				25	30	$120,000	
Bulk batch weighing system	BW				5	10	$160,000	
5500 t Silos w.aeration & sweeps	8	20m dia x 25m OA height			160	560	$1,200,000	
Silo unloading chain feeders	8		10	1,000	240	20	$200,000	
Magnets	8				40	16	$160,000	
Truck loading system for Grain	TLG			800	60	20	$200,000	
Railcar loading system for Grain	RLG			1,600	100	50	$500,000	
Truck Scales in/out	2					20	$80,000	
						Totl.tons		
				Misc.Utilities	129	2,185	$17,740,000	
Electric Equipment, MCC's, power distribution, controls, lighting, groundinc					2,700	kW total	$1,950,000	
(1) Wheel Loader for vessel clean out							$0	Existing
Mobile Maintenance Equipment							$0	Existing
			SUBTOTAL 1				$19,690,000	
			Spare Parts percentage of SUBTOTAL 1:			5.0%	$980,000	
Civils: Conveyor and Transfers Foundations							$570,000	
Civil Work on Land for Silos							$790,000	see details below
CIVILS: Marine works -							$0	by others
			SUBTOTAL 2				$22,030,000	
			Engineering percentage of SUBTOTAL 2:			5.0%	$1,100,000	
			SUBTOTAL 3				$23,130,000	
			Contingencies percentage of SUBTOTAL 3:			10.0%	$2,310,000	
			GRAND TOTAL			rounded	$25,400,000	

Civil Cost			Unit Cost			Item Cost	Remarks
Site Preparation 50 x 140 m	7,000	m²	$10			$70,000	
Soil Cement for 8 silos	3,200	m²	$25			$80,000	
Tunnels under silos	160	m	$4,000			$640,000	
			Total Civil Cost:			$790,000	entered above

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Table No. B-S5 BUDGET COST ESTIMATE SUMMARY

FINAL UPGRADING of BERTH No. 5S 5x600 t/h unloaders-77,000t storage

ITEM LIST	No	Conv. Width m	Conv. Length m	Conv. Capacity m.tph	Inst. kW	Inst.Wt. tons	Budget Cost US $	REMARKS Accuracy±20%
Belt Conveyors at Berth	C1a+b	1.6	400	1,800	260	540	$2,480,000	
Belt Conveyors to Storage	C2a+b	1.6	100	1,800	150	200	$980,000	
Continuous Unloaders	5			5 x 600	1,500	1,500	$20,000,000	35m reach from berth ctr
Chain Conveyors (20m)	4		20	1,600	280	20	$200,000	Avg.cost per m: $2,500
Chain Conveyors (120m)	3		120	1,600	263	90	$900,000	
Chain Conveyors (30m)	1		30	1,600	70	8	$80,000	Avg.wt. tons/m: 0.250
Bucket Elevators (40m)	2	H=	40	1,600	400	20	$200,000	
Bucket Elevators (25m)	2	H=	25	1,600	300	13	$130,000	
Bucket Elevators (18m)	2	H=	18	1,600	220	9	$90,000	
Chutes, spouts, valves	CH				20	60	$200,000	
Transfer Station C1/C2	TS1				8	25	$150,000	
Central Weighing Towers (2)	TSW				20	50	$500,000	
Transfer towers for chain conv's	TC				50	60	$240,000	
Bulk batch weighing systems (2)	BW				10	20	$320,000	
5500 t Silos w.aeration & sweeps	14	20m dia x 25m OA height			280	980	$2,100,000	
Silo unloading chain feeders	14		10	1,000	420	35	$350,000	
Magnets	14				70	28	$280,000	
Truck loading system for Grain	DUAL			2x800	120	40	$400,000	
Railcar loading system for Grain	DUAL			2x1,600	200	100	$1,000,000	
Truck Scales in/out	2					20	$80,000	
						Totl.tons		
				Misc.Utilities	232	3,818	$30,680,000	
Electric Equipment, MCC's, power distribution, controls, lighting, grounding					4,870	kW total	$3,410,000	
(1) Wheel Loader for vessel clean out							$0	Existing
Mobile Maintenance Equipment							$0	Existing
			SUBTOTAL 1				$34,090,000	
Spare Parts percentage of SUBTOTAL 1:						5.0%	$1,700,000	
Civils: Conveyor and Transfers Foundations							$1,070,000	
Civil Work on Land for Silos							$1,360,000	see details below
CIVILS: Marine works -							$0	by others
			SUBTOTAL 2				$38,220,000	
Engineering percentage of SUBTOTAL 2:						5.0%	$1,910,000	
			SUBTOTAL 3				$40,130,000	
Contingencies percentage of SUBTOTAL 3:						10.0%	$4,010,000	
			GRAND TOTAL			rounded	$44,100,000	

Civil Cost				Unit Cost			Item Cost	Remarks
Site Preparation 50 x 200 m		10,000	m²	$10			$100,000	
Soil Cement for 14 silos		5,600	m²	$25			$140,000	
Tunnels under silos		280	m	$4,000			$1,120,000	
				Total Civil Cost:			$1,360,000	entered above

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Table No. B-S6 BUDGET COST ESTIMATE SUMMARY

FINAL UPGRADING of BERTH No. 6S 3x500 t/h unloaders-44,000t storage

ITEM LIST	No	Conv. Width m	Conv. Length m	Conv. Capacity m.tph	Inst. kW	Inst.Wt. tons	Budget Cost US $	REMARKS Accuracy±20%
Belt Conveyor at Berth	C1	1.6	300	1,800	110	210	$0	Existing * see note
Belt Conveyor to Storage	C2	1.6	200	1,800	75	170	$0	Existing
Belt Conveyor to New Storage	C3	1.6	200	1,800	90	170	$790,000	
Mobile Hopper/Feeder for SU Ships	4	1.6	200	1,800	100	40	$400,000	Upgrading existing hoppers
Continuous Unloaders	3			3 x 500	900	900	$9,900,000	25m reach over fenderline
Chain Conveyors (20m)	4		20	1,600	160	20	$200,000	Avg.cost per m: $2,500
Chain Conveyors (60m)	3		60	1,600	150	45	$450,000	
Chain Conveyors (30m)	1		30	1,600	40	8	$80,000	Avg.wt. tons/m: 0.250
Bucket Elevators (40m)	1	H=	40	1,600	200	10	$100,000	
Bucket Elevators (25m)	1	H=	25	1,600	150	6	$60,000	
Bucket Elevators (18m)	1	H=	18	1,600	110	5	$50,000	
Chutes, spouts, valves	CH				10	30	$100,000	
Transfer Station C1/C2	TS1				8	40	$100,000	
Transfer Station C2/C3	TS2				8	40	$100,000	
Central Weighing Tower	TSW				10	25	$250,000	
Transfer towers for chain conv's	TC				25	30	$120,000	
Bulk batch weighing system	BW				5	10	$160,000	
5500 t Silos w.aeration & sweeps	8	20m dia x 25m OA height			160	560	$1,200,000	
Silo unloading chain feeders	8		10	1,000	240	20	$200,000	
Magnets	8				40	16	$160,000	
Truck loading system for Grain	TLG			800	60	20	$200,000	
Railcar loading system for Grain	RLG			1,600	100	50	$500,000	
Truck Scales in/out	2					20	$80,000	
						Totl.tons		
				Misc.Utilities	138	2,445	$15,200,000	
Electric Equipment, MCC's, power distribution, controls, lighting, groundinc					2,890 kW total		$1,600,000	
(1) Wheel Loader for vessel clean out							$0	Existing
Mobile Maintenance Equipment							$0	Existing
			SUBTOTAL 1				$16,800,000	
Spare Parts percentage of SUBTOTAL 1:						5.0%	$840,000	
Civils: Conveyor and Transfers Foundations							$490,000	
Civil Work on Land for Silos							$790,000	see details below
CIVILS: Marine works -							$0	by others
			SUBTOTAL 2				$18,920,000	
Engineering percentage of SUBTOTAL 2:						5.0%	$950,000	
			SUBTOTAL 3				$19,870,000	
Contingencies percentage of SUBTOTAL 3:						10.0%	$1,990,000	
			GRAND TOTAL			rounded	$21,900,000	

Civil Cost				Unit Cost			Item Cost	Remarks
Site Preparation 50 x 140 m		7,000	m²	$10			$70,000	
Soil Cement for 8 silos		3,200	m²	$25			$80,000	
Tunnels under silos		160	m	$4,000			$640,000	
				Total Civil Cost:			$790,000	entered above

NOTE: * Relocation of existing berth conveyor not included

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Table No. B-S7 BUDGET COST ESTIMATE SUMMARY

BASE: NEW BERTH FACES AT NEW LOCATION **3x500 t/h unloaders-77,000t storage**

ITEM LIST	No	Conv. Width m	Conv. Length m	Conv. Capacity m.tph	Inst. kW	Inst.Wt. tons	Budget Cost US $	REMARKS Accuracy±20%
Belt Conveyor at Berth	C1	1.6	400	1,800	260	270	$1,240,000	
Belt Conveyor to Storage	*C2*	*1.6*	*100*	*1,800*	*150*	*100*	*$490,000*	
Continuous Unloaders	C3			3 x 500	1,500	1,500	$9,900,000	25m reach over fenderline
Chain Conveyors (20m)	4		20	1,600	160	20	$200,000	Avg.cost per m: $2,500
Chain Conveyors (120m)	3		120	1,600	300	90	$900,000	
Chain Conveyors (30m)	1		30	1,600	40	8	$80,000	Avg.wt. tons/m: 0.250
Bucket Elevators (40m)	1	H=	40	1,600	200	10	$100,000	
Bucket Elevators (25m)	1	H=	25	1,600	150	6	$60,000	
Bucket Elevators (18m)	1	H=	18	1,600	110	5	$50,000	
Chutes, spouts, valves	CH				10	30	$100,000	
Transfer Station C1/C2	TS1				8	40	$100,000	
Central Weighing Tower	TSW				10	25	$250,000	
Transfer towers for chain conv's	TC				8	30	$120,000	
Bulk batch weighing system	BW				8	10	$160,000	
5500 t Silos w.aeration & sweeps	14	20m dia x 25m OA height			280	980	$2,100,000	
Silo unloading chain feeders	14		10	1,000	420	35	$350,000	
Magnets	14				70	28	$280,000	
Truck loading system for Grain	TLG			800	160	20	$200,000	
Railcar loading system for Grain	RLG			1,600	240	50	$500,000	
Truck Scales in/out	2					20	$80,000	
						Totl.tons		
				Misc.Utilities	204	3,277	$17,260,000	
Electric Equipment, MCC's, power distribution, controls, lighting, groundinc					4,290 kW total		$1,900,000	
(1) Wheel Loader for vessel clean out							$300,000	CAT 950E or equal
Mobile Maintenance Equipment							$100,000	
			SUBTOTAL 1				$19,560,000	
Spare Parts percentage of SUBTOTAL 1:						5.0%	$980,000	
Civils: Conveyor and Transfers Foundations							$740,000	
Civil Work on Land for Silos							$1,360,000	**see details below**
CIVILS: Marine works -							$0	**by others**
			SUBTOTAL 2				$22,640,000	
Engineering percentage of SUBTOTAL 2:						5.0%	$1,130,000	
			SUBTOTAL 3				$23,770,000	
Contingencies percentage of SUBTOTAL 3:						10.0%	$2,380,000	
			GRAND TOTAL			**rounded**	$26,200,000	

Civil Cost				Unit Cost			Item Cost	Remarks
Site Preparation 50 x 200 m		10,000	m²	$10			$100,000	
Soil Cement for 14 silos		5,600	m²	$25			$140,000	
Tunnels under silos		280	m	$4,000			$1,120,000	
				Total Civil Cost:			**$1,360,000**	**entered above**

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Table No. B-S7A BUDGET COST ESTIMATE SUMMARY

ALTERNATIVE A: NEW BERTH FACE AT NEW LOCATION

3x600 t/h unloaders-112,000t storage

ITEM LIST	No	Conv. Width m	Conv. Length m	Conv. Capacity m.tph	Inst. kW	Inst.Wt. tons	Budget Cost US $	REMARKS Accuracy±20%
Belt Conveyor at Berth	C1	1.6	400	1,800	260	270	$1,240,000	
Belt Conveyor to Storage	C2	1.6	100	1,800	150	100	$490,000	
Continuous Unloaders	3			3 x 600	1,500	1,500	$10,500,000	25m reach over fenderline
Chain Conveyors (20m)	4		20	1,800	160	24	$220,000	Avg.cost per m: $2,700
Chain Conveyors (120m)	3		120	1,800	300	108	$970,000	
Chain Conveyors (30m)	1		30	1,800	40	9	$80,000	Avg.wt. tons/m: 0.300
Bucket Elevators (40m)	1	H=	40	1,800	200	12	$110,000	
Bucket Elevators (25m)	1	H=	25	1,800	150	8	$70,000	
Bucket Elevators (18m)	1	H=	18	1,800	110	5	$50,000	
Chutes, spouts, valves	CH				10	30	$120,000	
Transfer Station C1/C2	TS1				8	40	$120,000	
Central Weighing Tower	TSW				10	25	$250,000	
Transfer towers for chain conv's	TC				8	30	$150,000	
Bulk batch weighing system	BW				8	10	$160,000	
18,700 t Silos w.aeration & sweeps	6	28m dia x 58m OA height			280	420	$3,600,000	
Silo unloading chain feeders	6		30	1,200	420	54	$480,000	
Magnets	6				70	12	$120,000	
Truck loading system for Grain	TLG			600	160	20	$400,000	
Railcar loading system for Grain	RLG			1,100	240	50	$750,000	
Truck Scales in/out	2					20	$80,000	
						Totl.tons		
				Misc.Utilities	204	2,747	$19,960,000	
Electric Equipment, MCC's, power distribution, controls, lighting, groundinc					4,290 kW total		$2,350,000	
(1) Wheel Loader for vessel clean out							$300,000	CAT 950E or equal
Mobile Maintenance Equipment							$100,000	
			SUBTOTAL 1				$22,710,000	
Spare Parts percentage of SUBTOTAL 1:						5.0%	$1,140,000	
Civils: Conveyor and Transfers Foundations							$950,000	
Civil Work on Land for Silos							$1,200,000	see details below
CIVILS: Marine works -							$0	by others
			SUBTOTAL 2				$26,000,000	
Engineering percentage of SUBTOTAL 2:						5.0%	$1,300,000	
			SUBTOTAL 3				$27,300,000	
Contingencies percentage of SUBTOTAL 3:						10.0%	$2,730,000	
			GRAND TOTAL			rounded	$30,000,000	

Civil Cost				Unit Cost			Item Cost	Remarks
Site Preparation 67 x 150 m		10,000	m²	$10			$100,000	
Soil Cement for 6 silos		5,600	m²	$25			$140,000	
Tunnels under silos		240	m	$4,000			$960,000	
				Total Civil Cost:			$1,200,000	entered above

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Table No. B-S7B BUDGET COST ESTIMATE SUMMARY

ALTERNATIVE B: TWO NEW BERTH FACES AT NEW LOCATION

Each 3x500 t/h unloaders-75,000t storage

ITEM LIST	No	Conv. Width m	Conv. Length m	Conv. Capacity m.tph	Inst. kW	Inst.Wt. tons	Budget Cost US $	REMARKS Accuracy±20%
Belt Conveyor at Berth	C1	1.6	400	1,800	260	270	$1,240,000	
Belt Conveyor to Storage	C2	1.6	100	1,800	150	100	$490,000	
Continuous Unloaders	3			3 x 500	1,500	1,500	$9,900,000	
Chain Conveyors (20m)	4		20	1,800	160	20	$200,000	Avg.cost per m: $2,500
Chain Conveyors (120m)	3		120	1,800	300	90	$900,000	
Chain Conveyors (30m)	1		30	1,800	40	8	$80,000	Avg.wt. tons/m: 0.250
Bucket Elevators (40m)	1	H=	40	1,800	200	10	$100,000	
Bucket Elevators (25m)	1	H=	25	1,800	150	6	$60,000	
Bucket Elevators (18m)	1	H=	18	1,800	110	5	$50,000	
Chutes, spouts, valves	CH				10	30	$100,000	
Transfer Station C1/C2	TS1				8	40	$100,000	
Central Weighing Tower	TSW				10	25	$250,000	
Transfer towers for chain conv's	TC				8	30	$120,000	
Bulk batch weighing system	BW				8	10	$160,000	
18,700 t Silos w.aeration & sweeps	4	28m dia x 58m OA height			280	280	$2,400,000	
Silo unloading chain feeders	4		10	1,200	420	10	$320,000	
Magnets	4				70	8	$80,000	
Truck loading system for Grain	TLG			600	160	20	$300,000	
Railcar loading system for Grain	RLG			1,100	240	50	$600,000	
Truck Scales in/out	2					20	$80,000	
						Totl.tons		
				Misc.Utilities	204	2,532	$17,530,000	
Electric Equipment, MCC's, power distribution, controls, lighting, groundinc					4,290 kW total		$2,080,000	
(1) Wheel Loader for vessel clean out							$300,000	CAT 950E or equal
Mobile Maintenance Equipment							$100,000	
			SUBTOTAL 1				$20,010,000	
Spare Parts percentage of SUBTOTAL 1:						5.0%	$1,000,000	
Civils: Conveyor and Transfers Foundations							$760,000	
Civil Work on Land for Silos							$900,000	see details below
CIVILS: Marine works -							$0	by others
			SUBTOTAL 2				$22,670,000	
Engineering percentage of SUBTOTAL 2:						5.0%	$1,130,000	
			SUBTOTAL 3				$23,800,000	
Contingencies percentage of SUBTOTAL 3:						10.0%	$2,380,000	
GRAND TOTAL for each berth face						rounded	$26,200,000	

Civil Cost				Unit Cost			Item Cost	Remarks
Site Preparation 67 x 120 m		8,000	m²	$10			$80,000	
Soil Cement for 4 silos		4,000	m²	$25			$100,000	
Tunnels under silos		180	m	$4,000			$720,000	
				Total Civil Cost:			$900,000	entered above

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BUDGET INFORMATION FOR FINAL REPORT

June 17, 2005
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USTDA - Veracruz Terminal Expansion Study
Summary of Grain Handling Improvements, Throughput Capacity and Demand Forecasts
Comparison Base Proposal versus TMV Berth — ALTERNATIVE A

DMJM HARRIS REPORT-Table 36B	Actual	Forecast				
YEAR	2002	2005	2010	2015	2020	2025
Base Forecast	5,903,641	6,503,121	7,505,444	8,483,357	9,373,791	10,397,705
Probable Forecast	**5,903,641**	**6,834,203**	**8,722,367**	**11,132,196**	**14,207,816**	**18,133,174**
Optimistic Forecast	5,903,641	7,334,075	10,529,013	15,115,760	21,700,628	31,154,058

GRAIN UNLOADING	FUTURE PROJECTIONS - BASE PROPOSAL						FUTURE PROJECTIONS - TMV BERTH ALTERNATIVE *					
	Annual Throughput Average tons	Start Project & Con-struction *	Finish Project & Con-struction *	Suits Probable *Forecast* Until	Storage *tons*	Equipment Budget Cost Million US$	Annual Throughput Average tons	Start Project & Con-struction *	Finish Project & Con-struction *	Suits Probable *Forecast* Until	Storage *tons*	Equipment Budget Cost Million US$
Present Capability	**6,200,000**	-	-	-	**146,000**	-	**6,200,000**	-	-	-	**146,000**	-
INTERMEDIATE STEP	**7,905,000**	**2005**	**2006**	**2008**	**156,000**	**$14.800**	**8,200,000**	**2005**	**2006**	**2009**	**208,000**	**$5.000 °**
FIRST STEP	**9,835,000**	**2006**	**2007**	**2012**	**200,000**	**$22.600**	**10,360,000**	**2007**	**2008**	**2013**	**228,000**	**$19.200**
SECOND STEP	**12,220,000**	**2011**	**2012**	**2017**	**245,000**	**$25.400**	**12,290,000**	**2012**	**2013**	**2017**	**272,000**	**$22.600**
THIRD STEP	**13,920,000**	**2014**	**2015**	**2020**	**280,000**	**$18.700**	**14,220,000**	**2016**	**2017**	**2020**	**307,000**	**$25.400**
FOURTH STEP	**15,850,000**	**2018**	**2019**	**2022**	**320,000**	**$21.900**	**17,850,000**	**2019**	**2020**	**2025**	**352,000**	**$40.600**
STEP FIVE	**21,050,000**	-	-	-	**432,000**	**$30.000**	**23,050,000**	-	-	-	**464,000**	**$30.000**
					TOTAL:	**133.400**					**TOTAL:**	**142.800**

NOTES: * Assuming a two year project, procurement and construction time Schedule
+ Equipment budget cost does not include marine foundations, modifications to berths, etc.
Budget cost accuracy plus/minus 20% **° Budget indicated by TMV**

USTDA APIVER Feasibility Study for the Veracruz Port Expansion Project

Table B-1a) Summary of Grain Handling Improvements, Throughput Capacity and Demand Forecasts

Base Proposal - Alternative A

From Section 3 Table 36B		Actual	Forecast					Conclusion		
YEAR		2002	2005	2010	2015	2020	2025			
Base Forecast		5,903,641	6,503,121	7,505,444	8,483,357	9,373,791	10,397,705	Existing port developed to first step suits 2022		
Probable Forecast		5,903,641	6,834,203	8,722,367	11,132,196	14,207,816	18,133,174	Existing port developed to fourth step suits 2022		
Optimistic Forecast		5,903,641	7,334,075	10,529,013	15,115,760	21,700,628	31,154,058	Existing+NEW port developed to fifth step suits 2025		
TERMINAL	**FROM APIVER REPORT**		**Present Capability projected to 65% occupancy**					**Storage turns/year**	**Existing Storage Cap. Tons**	**Storage Throughput Limit tons**
	2002 Occupancy	**2002 *Tonnage***	***t/y low at 65% occ.***	***t/y high at 65% occ.***	**EXISTING EQUIPMENT**					
CARGILL 200m EJetty	72.1%	1,805,492	1,600,000	1,700,000	2x500t/h pneum.unloaders, RR/Tr.Loadout			52.1	50,000	2,600,000
TCE B#6S L~302m	84.5%	1,936,922	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Load-out					
TCE B#4S L~380m	66.1% + 80.7%	1,297,001	1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars					
TCE Other	(inner+outer)	880,233	1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars					
TCE Subtotal		4,114,156	4,500,000	4,600,000				52.1	96,000	5,000,000
GRAIN TOTAL		**5,919,648**	**6,100,000**	**6,300,000**				[7d. dwell time]	**146,000**	**7,600,000**
TERMINAL	**FUTURE ADDITIONS INTERMEDIATE STEP**		**PROJECTIONS**		**EQUIPMENT REQUIREMENTS INTERMEDIATE STEP**			**Storage turns/year**	**Exist.+*New* Storage Cap.Tons**	**Storage Throughput Limit tons**
			t/y Low	**t/y High**						
CARGILL 200m EJetty			1,600,000	1,700,000	2x500t/h pneum.unloaders, RR/Tr.Loadout			Existing	50,000	
	Add 500t/h unloader, RR-loadout		1,200,000	1,300,000	1 x 500t/h unloader, RR/Truck Loadout			New storage	*10,000*	
CARGILL Subtotal	Increase conveyor capacity		2,800,000	3,000,000	2 x 1,000 t/h conveyor systems			52.1	60,000	3,130,000
TCE B#6S L~302m	As existing at 65% occupancy		1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout					
TCE B#5N L~270m	Mobile hoppers/conveyors		1,800,000	1,840,000	4x250t/h mobile hoppers, conveyor system			Existing	96,000	
TCE B#5S L~270m	As existing at #4S; 65% occupancy		1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars			New storage	*0*	
TCE Subtotal			4,950,000	5,060,000				52.1	96,000	5,010,000
GRAIN TOTAL	**AVERAGE: 7,905,000**		**7,750,000**	**8,060,000**				[7d. dwell time]	**156,000**	**8,140,000**
TERMINAL	**FUTURE ADDITIONS FIRST STEP**		**PROJECTIONS**		**EQUIPMENT REQUIREMENTS FIRST STEP**			**Storage turns/year**	**Exist.+*New* Storage Cap.Tons**	**Storage Throughput Limit tons**
			t/y Low	**t/y High**						
CARGILL 200m EJetty	No further additions		2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts					
CARGILL Subtotal			2,800,000	3,000,000	2 x 1,000 t/h conveyor systems			52.1	60,000	3,130,000
TCE B#6S L~302m	As existing at 65% occupancy		1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout					
TCE B#5N L~270m	Add 3 unloaders, RR/Tr.Loadout		3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout			Existing	96,000	
TCE B#5S L~270m	As existing at #4S; 65% occupancy		1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars			New storage	*44,000*	
TCE Subtotal			6,750,000	7,120,000				52.1	140,000	7,300,000
GRAIN TOTAL	**AVERAGE: 9,835,000**		**9,550,000**	**10,120,000**				[7d. dwell time]	**200,000**	**10,430,000**
TERMINAL	**FUTURE ADDITIONS SECOND STEP**		**PROJECTIONS**		**EQUIPMENT REQUIREMENTS SECOND STEP**			**Storage turns/year**	**Exist.+*New* Storage Cap.Tons**	**Storage Throughput Limit tons**
			t/y Low	**t/y High**						
CARGILL 200m EJetty	No further additions		2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts					
CARGILL Subtotal			2,800,000	3,000,000	2 x 1,000 t/h conveyor systems			52.1	60,000	3,130,000
TCE B#6S L~302m	As existing at 65% occupancy		1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout					
TCE B#5N L~270m	No further additions		3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout			From prev.step	140,000	
TCE B#5S L~270m	Add 3 unloaders, RR/Tr.Loadout		3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout			New storage	*45,000*	
TCE Subtotal			9,000,000	9,640,000				52.1	185,000	9,650,000
GRAIN TOTAL	**AVERAGE: 12,220,000**		**11,800,000**	**12,640,000**				[7d. dwell time]	**245,000**	**12,780,000**
TERMINAL	**FUTURE ADDITIONS THIRD STEP**		**PROJECTIONS**		**EQUIPMENT REQUIREMENTS THIRD STEP**			**Storage turns/year**	**Exist.+*New* Storage Cap.Tons**	**Storage Throughput Limit tons**
			t/y Low	**t/y High**						
CARGILL 200m EJetty	No further additions		2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts					
CARGILL Subtotal			2,800,000	3,000,000	2 x 1,000 t/h conveyor systems			52.1	60,000	3,130,000
TCE B#6S L~302m	*As existing at 65% occupancy*		*1,800,000*	*1,840,000*	*Self-unloading ships, 2 conv's to Loadout*					
TCE B#5N L~270m	No further additions		3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout			From prev.step	185,000	
TCE B#5S L~270m	Add 2 unloaders, RR/Tr.Loadout		5,250,000	5,650,000	(2+3)x600t/h unloaders, 2 RR/Truck Loadouts			New storage	*35,000*	
TCE Subtotal			10,650,000	11,390,000				52.1	220,000	11,470,000
GRAIN TOTAL	**AVERAGE: 13,920,000**		**13,450,000**	**14,390,000**				[7d. dwell time]	**280,000**	**14,600,000**
TERMINAL	**FUTURE ADDITIONS FOURTH STEP**		**PROJECTIONS**		**EQUIPMENT REQUIREMENTS FOURTH STEP**			**Storage turns/year**	**Exist.+*New* Storage Cap.Tons**	**Storage Throughput Limit tons**
			t/y Low	**t/y High**						
CARGILL 200m EJetty	No further additions		2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts					
CARGILL Subtotal			2,800,000	3,000,000	2 x 1,000 t/h conveyor systems			52.1	60,000	3,130,000
TCE B#6S L~302m	Add 3 unloaders, RR/Tr.Loadout		3,600,000	3,900,000	3x500t/h unloaders, 2 RR/Tuck Loadouts					
TCE B#5N L~270m	*No further additions*		*3,600,000*	*3,900,000*	*3x600t/h unloaders, 1 RR/Tuck Loadout*			*From prev.step*	*220,000*	
TCE B#5S L~270m	No further additions		5,250,000	5,650,000	5x600t/h unloaders, 2 RR/Truck Loadouts			New storage	*40,000*	
TCE Subtotal			12,450,000	13,450,000				52.1	260,000	13,560,000
GRAIN TOTAL	**AVERAGE: 15,850,000**		**15,250,000**	**16,450,000**				[7d. dwell time]	**320,000**	**16,690,000**
TERMINAL	**FUTURE ADDITIONS STEP FIVE**		**PROJECTIONS**		**EQUIPMENT REQUIREMENTS STEP FIVE**			**Storage turns/year**	**Exist.+*New* Storage Cap.Tons**	**Storage Throughput Limit tons**
			t/y Low	**t/y High**						
CARGILL 200m EJetty	No further additions		2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts			[7d. dwell time]		
CARGILL Subtotal			2,800,000	3,000,000	2 x 1,000 t/h conveyor systems			52.1	60,000	3,130,000
TCE B#6S L~302m	No further additions		3,600,000	3,900,000	3x500t/h unloaders, 2 RR/Tuck Loadouts			[7d. dwell time]		
TCE B#5N L~270m	No further additions		3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout			From prev.step	260,000	
TCE B#5S L~270m	No further additions		5,250,000	5,650,000	5x600t/h unloaders, 2 RR/Truck Loadouts			No additions	-	
TCE Subtotal			12,450,000	13,450,000				52.1	260,000	13,560,000
New Location New Berth - L~300m	One berth face: Arrangement of each jetty face similar to Berth #4N		5,150,000	5,250,000	3x600t/h unloaders, RR &Tuck Loadouts			52.1	*112,000*	5,800,000
GRAIN TOTAL	**AVERAGE: 21,050,000**		**20,400,000**	**21,700,000**				[7d. dwell time]	**432,000**	**22,490,000**

USTDA APIVER Feasibility Study for the Veracruz Port Expansion Project

Table B-1b) Summary of Grain Handling Improvements, Throughput Capacity and Demand Forecasts

Project with TMV - Alternative A

From Section 3 Table 36B		Actual	Forecast					Conclusion
YEAR		2002	2005	2010	2015	2020	2025	
Base Forecast		5,903,641	6,503,121	7,505,444	8,483,357	9,373,791	10,397,705	Existing port developed to first step suits 2025
Probable Forecast		5,903,641	6,834,203	8,722,367	11,132,196	14,207,816	18,133,174	Existing port developed to fourth step suits 2025
Optimistic Forecast		5,903,641	7,334,075	10,529,013	15,115,760	21,700,628	31,154,058	Existing+NEW port developed to fifth step suits 2025

TERMINAL	FROM APIVER REPORT		Present Capability projected to 65% occupancy					
	2002 Occupancy	2002 Tonnage	t/y low at 65% occ.	t/y high at 65% occ.	EXISTING EQUIPMENT	Storage turns/year	Existing Storage Cap. Tons	Storage Throughput Limit tons
CARGILL 200m EJetty	72.1%	1,805,492	1,600,000	1,700,000	2x500t/h pneum.unloaders, RR/Tr.Loadout	52.1	50,000	2,600,000
TCE B#6S L~302m	84.5%	1,936,922	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Load-out			
TCE B#4S L~380m	66.1% + 80.7%	1,297,001	1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars			
TCE Other	(inner+outer)	880,233	1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars			
TCE Subtotal		4,114,156	4,500,000	4,600,000		52.1	96,000	5,000,000
GRAIN TOTAL		**5,919,648**	**6,100,000**	**6,300,000**		[7d. dwell time]	**146,000**	**7,600,000**

TERMINAL	FUTURE ADDITIONS INTERMEDIATE STEP	PROJECTIONS		EQUIPMENT REQUIREMENTS INTERMEDIATE STEP	Storage turns/year	Exist.+New Storage Cap.Tons	Storage Throughput Limit tons
		t/y Low	t/y High				
CARGILL 200m EJetty	As existing at 65% occupancy	1,600,000	1,700,000	2x500t/h pneum.unloaders, RR/Tr.Loadout	52.1	50,000	2,600,000
TMV Berth	Traveling conv's for SUShips			Traveling receiving conveyors for SUShips	32.3	*New storage*	
	1,000t/h conv.system,RR&Tr.L.O.	2,000,000	2,000,000	1,000t/h conv.system, RR&Truck Loadouts	[11d.dwell time]	*62,000*	2,000,000
TCE B#6S L~302m	As existing at 65% occupancy	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout			
TCE B#5N L~270m	*As existing at #4N; 65% occupancy*	*1,350,000*	*1,380,000*	*Self-unloading ships loading trucks/rail-cars*	*Existing*	*96,000*	
TCE B#5S L~270m	As existing at #4S; 65% occupancy	1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars	No additions	-	
TCE Subtotal		4,500,000	4,600,000		52.1	96,000	5,000,000
GRAIN TOTAL	***AVERAGE: 8,200,000***	***8,100,000***	***8,300,000***		[7d. dwell time]	**208,000**	**9,600,000**

TERMINAL	FUTURE ADDITIONS FIRST STEP	PROJECTIONS		EQUIPMENT REQUIREMENTS FIRST STEP	Storage turns/year	Exist.+New Storage Cap.Tons	Storage Throughput Limit tons
		t/y Low	t/y High				
CARGILL 200m EJetty		1,600,000	1,700,000	2x500t/h pneum.unloaders, RR/Tr.Loadout	Existing	50,000	
	Add 500t/h unloader, RR-loadout	1,200,000	1,300,000	1 x 500t/h unloader, RR/Truck Loadout	New storage	*10,000*	
CARGILL Subtotal	Increase conveyor capacity	2,800,000	3,000,000	2 x 1,000 t/h conveyor systems	52.1	60,000	3,100,000
TMV Berth	No further additions	2,000,000	2,000,000	1000t/h conv.system, RR&Truck Loadouts	32.3	62,000	2,000,000
TCE B#6S L~302m	As existing at 65% occupancy	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout	[11d.dwell time]		
TCE B#5N L~270m	Mobile hoppers/conveyors	1,800,000	1,840,000	4x250t/h mobile hoppers, conveyor system	Existing	96,000	
TCE B#5S L~270m	Mobile hoppers/conveyors	1,800,000	1,840,000	4x250t/h mobile hoppers, conveyor system	New storage	*10,000*	
TCE Subtotal		5,400,000	5,520,000		52.1	106,000	5,500,000
GRAIN TOTAL	**AVERAGE: 10,360,000**	**10,200,000**	**10,520,000**		[7d. dwell time]	**228,000**	**10,600,000**

TERMINAL	FUTURE ADDITIONS SECOND STEP	PROJECTIONS		EQUIPMENT REQUIREMENTS SECOND STEP	Storage turns/year	Exist.+New Storage Cap.Tons	Storage Throughput Limit tons
		t/y Low	t/y High				
CARGILL 200m EJetty	No further additions	2,800,000	3,000,000	3x500t/h unloaders, 2 RR/Tr.Loadouts	52.1	*60,000*	*3,100,000*
TMV Berth	No further additions	2,000,000	2,000,000	1000t/h conv.system, RR&Truck Loadouts	32.3	*62,000*	*2,000,000*
TCE B#6S L~302m	As existing at 65% occupancy	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout	[11d.dwell time]		
TCE B#5N L~270m	Add 3 unloaders, RR/Tr.Loadout	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	*106,000*	
TCE B#5S L~270m	No further additions	1,800,000	1,840,000	4x250t/h mobile hoppers, conveyor system	New storage	*44,000*	
TCE Subtotal		7,200,000	7,580,000		52.1	150,000	7,800,000
GRAIN TOTAL	***AVERAGE: 12,290,000***	***12,000,000***	***12,580,000***		*[7d. dwell time]*	**272,000**	**12,900,000**

TERMINAL	FUTURE ADDITIONS THIRD STEP	PROJECTIONS		EQUIPMENT REQUIREMENTS THIRD STEP	Storage turns/year	Exist.+New Storage Cap.Tons	Storage Throughput Limit tons
		t/y Low	t/y High				
CARGILL 200m EJetty	No further additions	2,800,000	3,000,000	3x500t/h unloaders, 2 RR/Tr.Loadouts	52.1	60,000	3,100,000
TMV Berth	No further additions	2,000,000	2,000,000	1000t/h conv.system, RR&Truck Loadouts	32.3	62,000	2,000,000
TCE B#6S L~302m	*As existing at 65% occupancy*	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout	[11d.dwell time]		
TCE B#5N L~270m	No further additions	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	150,000	
TCE B#5S L~270m	Add 3 unloaders, RR/Tr.Loadout	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	New storage	*35,000*	
TCE Subtotal		9,000,000	9,640,000		52.1	185,000	9,600,000
GRAIN TOTAL	**AVERAGE: 14,220,000**	**13,800,000**	**14,640,000**		[7d. dwell time]	**307,000**	**14,700,000**

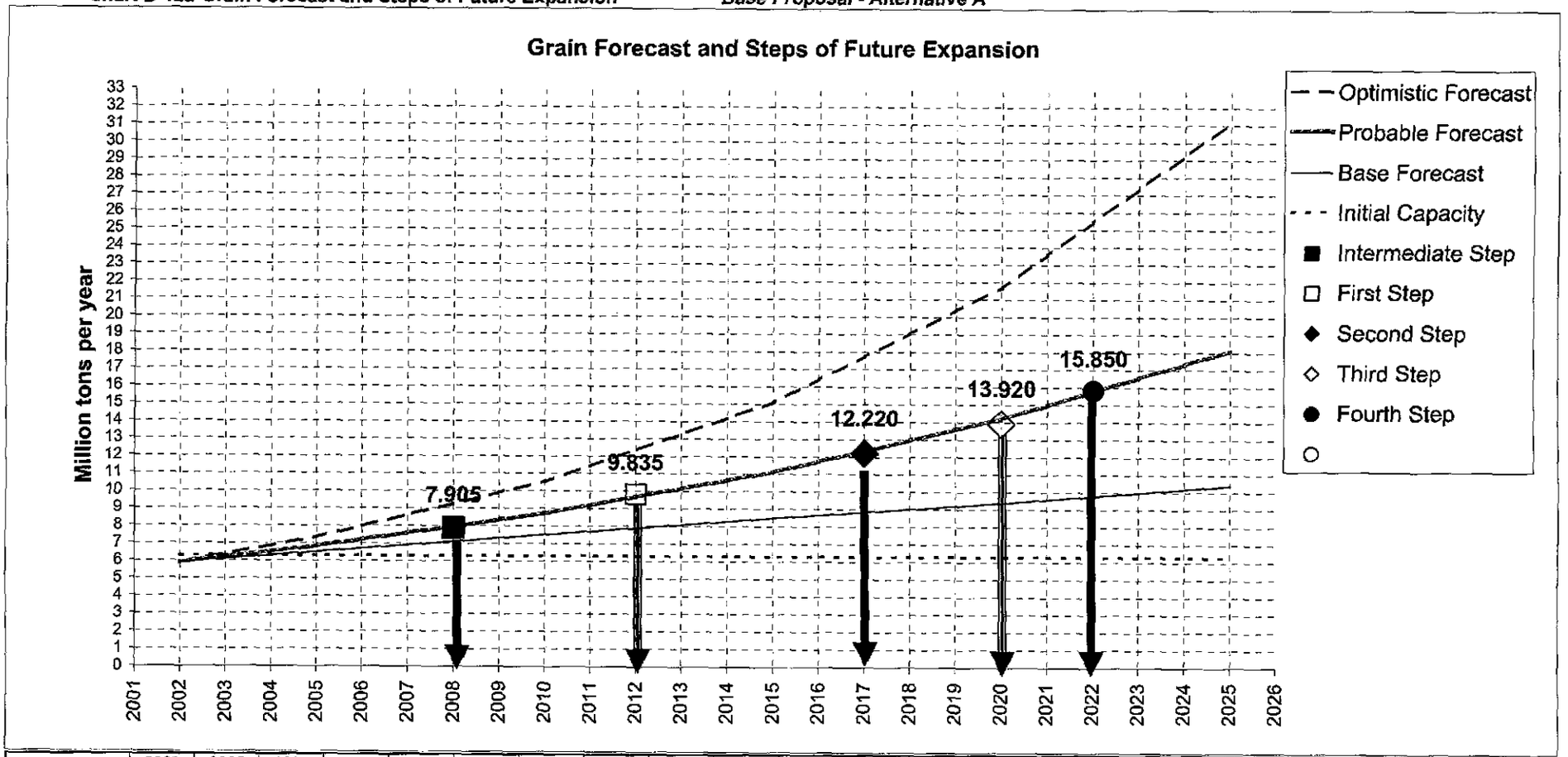
TERMINAL	FUTURE ADDITIONS *FOURTH STEP*	PROJECTIONS		EQUIPMENT REQUIREMENTS *FOURTH STEP*	Storage *turns/year*	Exist.+New Storage Cap.Tons	Storage Throughput Limit tons
		t/y Low	t/y High				
CARGILL 200m EJetty	No further additions	2,800,000	3,000,000	3x500t/h unloaders, 2 RR/Tr.Loadouts	52.1	60,000	3,100,000
TMV Berth	No further additions	2,000,000	2,000,000	1000t/h conv.system, RR&Truck Loadouts	32.3	62,000	2,000,000
TCE B#6S L~302m	Add 3 unloaders, RR/Tr.Loadout	3,600,000	3,900,000	3x500t/h unloaders, 2 RR/Tuck Loadouts	[11d.dwell time]		
TCE B#5N L~270m	No further additions	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	185,000	
TCE B#5S L~270m	Add 2 unloaders, RR/Tr.Loadout	5,250,000	5,650,000	(2+3)x600t/h unloaders, 2 RR/Truck Loadouts	New storage	*45,000*	
TCE Subtotal		12,450,000	13,450,000		*52.1*	*230,000*	*12,000,000*
GRAIN TOTAL	**AVERAGE: 17,850,000**	**17,250,000**	**18,450,000**		[7d. dwell time]	**352,000**	**17,100,000**

TERMINAL	FUTURE ADDITIONS STEP FIVE	PROJECTIONS		EQUIPMENT REQUIREMENTS STEP FIVE	Storage turns/year	Exist.+New *Storage* Cap.Tons	Storage *Throughput* Limit tons
		t/y Low	t/y High				
CARGILL 200m EJetty	No further additions	2,800,000	3,000,000	3x500t/h unloaders, 2 RR/Tr.Loadouts	52.1	60,000	3,100,000
TMV Berth	No further additions	2,000,000	2,000,000	*1000t/h conv.system, RR&Truck Loadouts*	32.3	*62,000*	*2,000,000*
TCE B#6S L~302m	No further additions	3,600,000	3,900,000	3x500t/h unloaders, 2 RR/Tuck Loadouts	[11d.dwell time]		
TCE B#5N L~270m	No further additions	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	230,000	
TCE B#5S L~270m	No further additions	5,250,000	5,650,000	*5x600t/h unloaders, 2 RR/Truck Loadouts*	*No additions*	-	
TCE Subtotal		12,450,000	13,450,000		52.1	230,000	12,000,000
New Location New Berth - L~300m	One berth face: Arrangement of each jetty face similar to Berth #4N	5,150,000	5,250,000	3x600t/h unloaders, RR &Tuck Loadouts	52.1	*112,000*	5,800,000
GRAIN TOTAL	**AVERAGE: 23,050,000**	**22,400,000**	**23,700,000**		[7d. dwell time]	**464,000**	**22,900,000**

June 17, 2005
by: K.Kroeter

USTDA APIVER Feasibility Study for the Veracruz Port Expansion Project

Chart B-12a Grain Forecast and Steps of Future Expansion **Base Proposal - Alternative A**



	2002	2005	2006	2007	**2008**	2009	2010	2011	**2012**	2013	2014	2015	2016	**2017**	2018	2019	**2020**	2021	**2022**	2023	2024	**2025**
Base Forecast	5.904	6.503	6.704	6.904	7.105	7.305	7.505	7.701	7.897	8.092	8.288	8.483	8.661	8.840	9.018	9.196	9.374	9.579	9.783	9.988	10.193	10.398
Probable Forecast	**5.904**	**6.834**	**7.212**	**7.589**	**7.967**	**8.345**	**8.722**	**9.204**	**9.686**	**10.168**	**10.650**	**11.132**	**11.747**	**12.362**	**12.978**	**13.593**	**14.208**	**14.993**	**15.778**	**16.563**	**17.348**	**18.133**
Optimistic Forecast	5.904	7.334	7.973	8.612	9.251	9.890	10.529	11.446	12.364	13.281	14.198	15.116	16.433	17.750	19.067	20.384	21.701	23.591	25.482	27.373	29.263	31.154
Initial Capacity	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300
Intermediate Step					**7.905**																	
First Step									**9.835**													
Second Step														**12.220**								
Third Step																	**13.920**					
Fourth Step																			**15.850**			

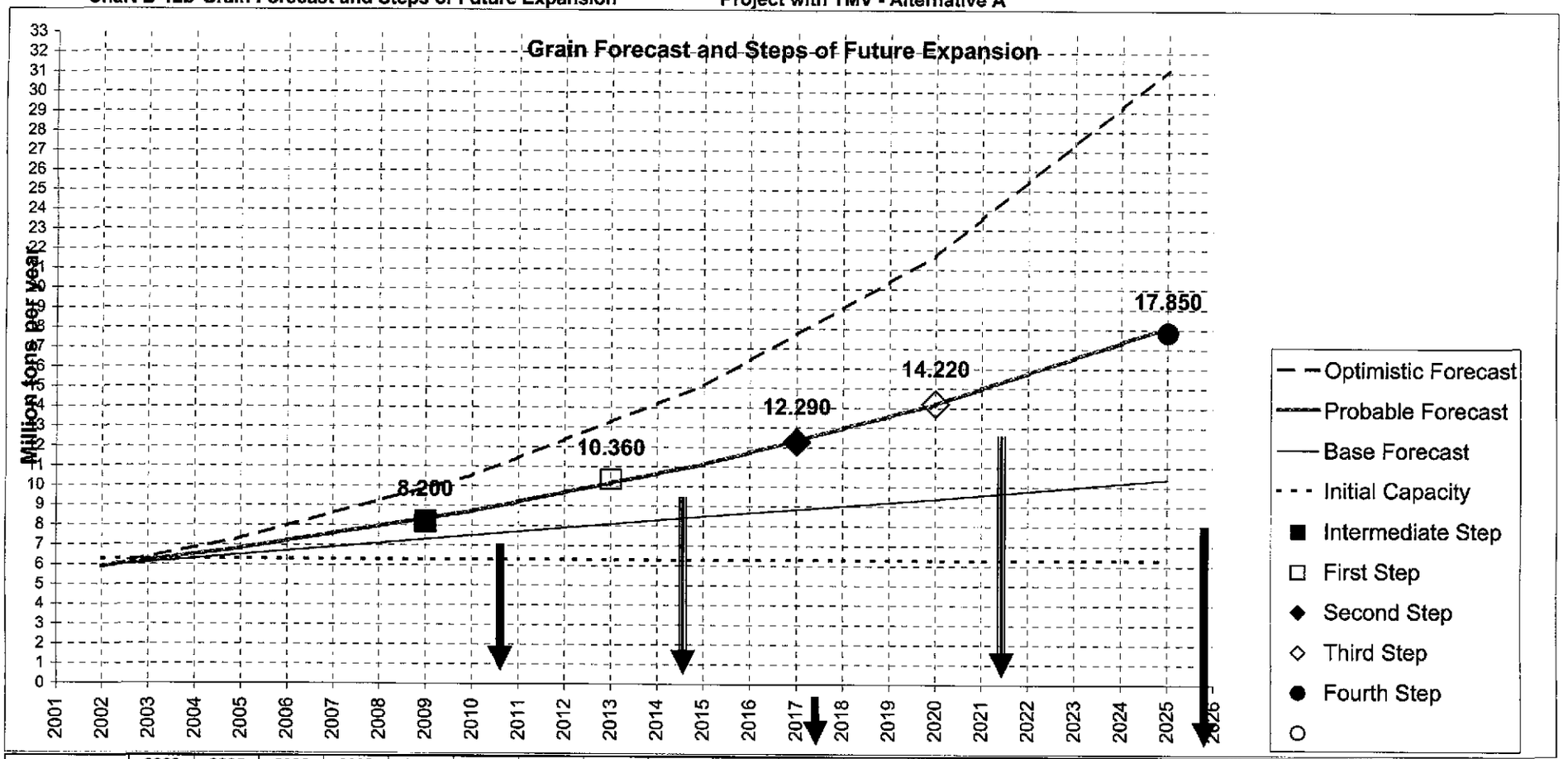
BULK MATERIAL HANDLING CONSULTING

PORT DEVELOPMENT • CARGO HANDLING SYSTEMS • OFFSHORE TERMINALS

June 17, 2005
by: K.Kroeter

USTDA APIVER Feasibility Study for the Veracruz Port Expansion Project

Chart B-12b Grain Forecast and Steps of Future Expansion — Project with TMV - Alternative A



	2002	2005	2006	2007	2008	**2009**	2010	2011	2012	**2013**	2014	2015	2016	**2017**	2018	2019	**2020**	2021	2022	2023	2024	**2025**
Base Forecast	5.904	6.503	6.704	6.904	7.105	7.305	7.505	7.701	7.897	8.092	8.288	8.483	8.661	8.840	9.018	9.196	9.374	9.579	9.783	9.988	10.193	10.398
Probable Forecast	**5.904**	**6.834**	**7.212**	**7.589**	**7.967**	**8.345**	**8.722**	**9.204**	**9.686**	**10.168**	**10.650**	**11.132**	**11.747**	**12.362**	**12.978**	**13.593**	**14.208**	**14.993**	**15.778**	**16.563**	**17.348**	**18.133**
Optimistic Forecast	5.904	7.334	7.973	8.612	9.251	9.890	10.529	11.446	12.364	13.281	14.198	15.116	16.433	17.750	19.067	20.384	21.701	23.591	25.482	27.373	29.263	31.154
Initial Capacity	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300
Intermediate Step						**8.200**																
First Step										**10.360**												
Second Step														**12.290**								
Third Step																	**14.220**					
Fourth Step																						**17.850**

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USTDA - Veracruz Terminal Expansion Study

Summary of Grain Import Activities and Projections to the Future

DMJM HARRIS REPORT-Table 36B	Actual	Forecast					Conclusion
YEAR	2002	2005	2010	2015	2020	2025	
Base Forecast	5,903,641	6,503,121	7,505,444	8,483,357	9,373,791	10,397,705	Existing port developed to first step suits 2022
Probable Forecast	5,903,641	6,834,203	8,722,367	11,132,196	14,207,816	18,133,174	Existing port developed to fourth step suits 2022
Optimistic Forecast	5,903,641	7,334,075	10,529,013	15,115,760	21,700,628	31,154,058	Existing+NEW port developed to fifth step suits 2025

TERMINAL	FROM APIVER REPORT 2002 Occupancy	2002 Tonnage	Present Capability projected to 65% occupancy t/y low at 65% occ.	t/y high at 65% occ.	EXISTING EQUIPMENT	Storage turns/year	Existing Storage Cap. Tons	Storage Throughput Limit tons
CARGILL 200m EJetty	72.1%	1,805,492	1,800,000	1,700,000	2x500t/h pneum.unloaders, RR/Tr.Loadout	52.1	50,000	2,600,000
TCE B#6S L~302m	84.5%	1,936,922	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Load-out			
TCE B#4S L~380m	66.1% + 80.7%	1,297,001	1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars			
TCE Other	(inner+outer)	880,233	1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars			
TCE Subtotal		4,114,156	4,500,000	4,600,000		52.1	96,000	5,000,000
GRAIN TOTAL		**5,919,648**	**6,100,000**	**6,300,000**		[7d. dwell time]	**146,000**	**7,600,000**

TERMINAL	FUTURE ADDITIONS INTERMEDIATE STEP	PROJECTIONS t/y Low	t/y High	EQUIPMENT REQUIREMENTS INTERMEDIATE STEP	Storage turns/year	Exist.+New Storage Cap.Tons	Storage Throughput Limit tons
CARGILL 200m EJetty		1,600,000	1,700,000	2x500t/h pneum.unloaders, RR/Tr.Loadout	Existing	50,000	
	Add 500t/h unloader, RR-loadout	1,200,000	1,300,000	1 x 500t/h unloader, RR/Truck Loadout	New storage	*10,000*	
CARGILL Subtotal	*Add 600 t/h conveyor system*	*2,800,000*	*3,000,000*	*3 x 600 t/h conveyor systems*	*52.1*	*60,000*	3,130,000
TCE B#6S L~302m	As existing at 65% occupancy	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout			
TCE B#5N L~270m	Mobile hoppers/conveyors	1,800,000	1,840,000	4x250t/h mobile hoppers, conveyor system	Existing	96,000	
TCE B#5S L~270m	As existing at 65% occupancy	1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars	New storage	*0*	
TCE Subtotal		4,950,000	5,060,000		52.1	96,000	5,010,000
GRAIN TOTAL		**7,750,000**	**8,060,000**		[7d. dwell time]	**156,000**	**8,140,000**

TERMINAL	FUTURE ADDITIONS FIRST STEP	PROJECTIONS t/y Low	t/y High	EQUIPMENT REQUIREMENTS FIRST STEP	Storage turns/year	Exist.+New Storage Cap.Tons	Storage Throughput Limit tons
CARGILL 200m EJetty	No further additions	2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts			
CARGILL Subtotal		2,800,000	3,000,000	3 x 600 t/h conveyor systems	52.1	60,000	3,130,000
TCE B#6S L~302m	As existing at 65% occupancy	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout			
TCE B#5N L~270m	Add 3 unloaders, RR/Tr.Loadout	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	Existing	96,000	
TCE B#5S L~270m	As existing at 65% occupancy	1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars	New storage	*44,000*	
TCE Subtotal		6,750,000	7,120,000		52.1	140,000	7,300,000
GRAIN TOTAL		**9,550,000**	**10,120,000**		[7d. dwell time]	**200,000**	**10,430,000**

TERMINAL	FUTURE ADDITIONS SECOND STEP	PROJECTIONS t/y Low	t/y High	EQUIPMENT REQUIREMENTS SECOND STEP	Storage turns/year	Exist.+New Storage Cap.Tons	Storage Throughput Limit tons
CARGILL 200m EJetty	No further additions	2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts			
CARGILL Subtotal		2,800,000	3,000,000	3 x 600 t/h conveyor systems	52.1	60,000	3,130,000
TCE B#6S L~302m	As existing at 65% occupancy	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout			
TCE B#5N L~270m	No further additions	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	140,000	
TCE B#5S L~270m	Add 3 unloaders, RR/Tr.Loadout	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	New storage	*45,000*	
TCE Subtotal		9,000,000	9,640,000		52.1	185,000	9,650,000
GRAIN TOTAL		**11,800,000**	**12,640,000**		[7d. dwell time]	**245,000**	**12,780,000**

TERMINAL	FUTURE ADDITIONS THIRD STEP	PROJECTIONS t/y Low	t/y High	EQUIPMENT REQUIREMENTS THIRD STEP	Storage turns/year	Exist.+New Storage Cap.Tons	Storage Throughput Limit tons
CARGILL 200m EJetty	No further additions	2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts			
CARGILL Subtotal		2,800,000	3,000,000	3 x 600 t/h conveyor systems	52.1	60,000	3,130,000
TCE B#6S L~302m	As existing at 65% occupancy	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout			
TCE B#5N L~270m	No further additions	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	185,000	
TCE B#5S L~270m	Add 2 unloaders, RR/Tr.Loadout	5,250,000	5,650,000	(2+3)x600t/h unloaders, 2 RR/Truck Loadouts	New storage	*35,000*	
TCE Subtotal		10,650,000	11,390,000		52.1	220,000	11,470,000
GRAIN TOTAL		**13,450,000**	**14,390,000**		[7d. dwell time]	**280,000**	**14,600,000**

TERMINAL	FUTURE ADDITIONS FOURTH STEP	PROJECTIONS t/y Low	t/y High	EQUIPMENT REQUIREMENTS FOURTH STEP	Storage turns/year	Exist.+New Storage Cap.Tons	Storage Throughput Limit tons
CARGILL 200m EJetty	No further additions	2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts			
CARGILL Subtotal		2,800,000	3,000,000	3 x 600 t/h conveyor systems	52.1	60,000	3,130,000
TCE B#6S L~302m	Add 3 unloaders, RR/Tr.Loadout	3,600,000	3,900,000	3x500t/h unloaders, 2 RR/Tuck Loadouts			
TCE B#5N L~270m	No further additions	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	220,000	
TCE B#5S L~270m	No further additions	5,250,000	5,650,000	5x600t/h unloaders, 2 RR/Truck Loadouts	New storage	*40,000*	
TCE Subtotal		12,450,000	13,450,000		52.1	260,000	13,560,000
GRAIN TOTAL		**15,250,000**	**16,450,000**		[7d. dwell time]	**320,000**	**16,690,000**

TERMINAL	*FUTURE ADDITIONS* FIFTH STEP	PROJECTIONS t/y Low	t/y High	*EQUIPMENT REQUIREMENTS* FIFTH STEP	*Storage* turns/year	Exist.+New Storage Cap.Tons	Storage Throughput Limit tons
CARGILL 200m EJetty	No further additions	2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts			
CARGILL Subtotal		2,800,000	3,000,000	3 x 600 t/h conveyor systems	52.1	60,000	3,130,000
TCE B#6S L~302m	No further additions	3,600,000	3,900,000	3x500t/h unloaders, 2 RR/Tuck Loadouts			
TCE B#5N L~270m	No further additions	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	260,000	
TCE B#5S L~270m	No further additions	5,250,000	5,650,000	5x600t/h unloaders, 2 RR/Truck Loadouts	No additions	-	
TCE Subtotal		12,450,000	13,450,000		52.1	260,000	13,560,000
New Location	Two berth faces: Arrangement of	3,600,000	3,900,000	3x500t/h unloaders, 1 RR/Tuck Loadout	52.1	*75,000*	3,910,000
New Jetty - L~300m	each jetty face similar to Berth #4N	3,600,000	3,900,000	3x500t/h unloaders, 1 RR/Tuck Loadout	52.1	*75,000*	3,910,000
New Location	Two berth faces: Arrangement of	3,600,000	3,900,000	3x500t/h unloaders, 1 RR/Tuck Loadout	52.1	*75,000*	3,910,000
New Jetty - L~300m	each jetty face similar to Berth #4N	3,600,000	3,900,000	3x500t/h unloaders, 1 RR/Tuck Loadout	52.1	*75,000*	3,910,000
GRAIN TOTAL		**29,650,000**	**32,050,000**		[7d. dwell time]	**620,000**	**32,330,000**

USTDA APIVER Feasibility Study for the Veracruz Port Expansion Project

Table B-2: Grain Unloading - Actual Operations 2002

ITEM No.	DESCRIPTION	2002 TOTAL	CARGILL TOTAL	TCE TOTAL	B # 6 S	B # 4 S	OTHERS [more than one berth]		EXPLANATIONS
	Actual annual tonnage 2002	**5.920**	**1.805**	**4.114**	1.937	1.297	0.880	mill.t	Input
1	**Average size of cargo**	**27,154**	**28,659**	**26,543**	27,670	27,021	23,790	tons	Input
2	Number of holds of vessel		5		5	5	5	holds	Input
3	*Unloader design rate*		*500*		*250*	*250*	*250*	*t/h*	*Input*
4a	Unloader interference factor		0.97		0.90	0.90	0.90	-	For several machines
4b	Truck transfer interference factor		1.00		1.00	0.37	0.37	-	For direct truck loading
5a	Number of unloaders		2		4	4	4	-	Input
5b	Design rate for number of unloaders		967		900	331	331	t/h	#3x#4ax4bx#5a
6a	Unavailable time at port (weather, maintenance		15.0	15.0	15.0	15.0	15.0	d/y	Input Assumption
6b	**Overall port availability**	**96%**	**96%**	**96%**	96%	96%	96%		(365 d - #6a)/365
	VESSEL TIME / EVENT								
7	Move vessel to berth and dock		1.0		1.0	1.0	1.0	hours	Assumption
8	Customs and paperwork		1.0		1.0	1.0	1.0	hours	Assumption
9	Vessel problems	Cargill	1.0	TCE	1.0	1.0	1.0	hours	Assumption
10	Unload cargo @ % of design rate:	38%	79.0	36%	85.3	226.4	199.3	hours	#1 / ([%]x#5b)
11	Hatch shifting 3 moves/hold [min]	10.0	1.3	10.0	0.6	0.6	0.6	h/unl.	3x[min]hx#2/(60x5a)
12	*Frontloader moves/hold in or out [min]*	*20.0*	*1.7*	*20.0*	*0.8*	*0.8*	*0.8*	*h/unl.*	*2x[min]hx#2/(60x5a)*
13	Unloader downtime of # 10,11,12:	5%	4.1	5%	4.3	11.4	10.0	hours	[%]x(#10+#11+#12)
14	Vessel shifting 2 moves/hold [h]:	0.0	0.0	0.0	0.0	0.0	0.0	hours	2 movesx[h]hx#2/5a
15	Downtime due to weather	5%	4.1	5%	4.3	11.4	10.0	hours	[%]x(#10+#11+#12)
16	Vessel time/draught survey		1.0		1.0	1.0	1.0	hours	Assumption
17	Vessel deberthing and transit time		2.0		2.0	2.0	2.0	hours	Assumption
18	Total berth time per vessel		96.1		101.4	256.7	226.9	hours	Sum#7 through #17
19	Average unloading rate @ berth time		298		273	105	105	t/h	#1/#18
20	Average berth unloading rate/design rate		31%		30%	32%	32%		100x(#19/#5b)
21	Operating hours per day (three shifts)		24.0		24.0	24.0	24.0	hours	Input Assumption
22	**Berth occupancy per vessel: Tb**	**6.47**	**4.01**	**7.48**	4.23	10.69	9.45	days	#18/#21
22a	**Berth transfer rate**	**4,195**	**7,155**	**3,550**	6,549	2,527	2,517	t/day	#1/#22
	ANNUAL PROJECTIONS:	**2002 TOTAL**	**CARGILL TOTAL**	**TCE TOTAL**	**B # 6 S**	**B # 4 S [2 berths]**	**OTHERS [more than one berth]**		
23	**Annual tonnage unloaded**	**5.920**	**1.805**	**4.114**	1.937	1.297	0.880	mill.t	Input
24	*Number of vessels unloaded*	*218*	*63*	*155*	*70*	*48*	*37*	*vessels*	*#23/#1*
25	Berth occupancy - hours	33,869	6,056	27,813	7,098	12,320	8,395	hours/yr	24 hx#22x#24
26	Total berth occupancy - days	1,411	252	1,159	296	513	350	days/yr	#22x#24
27	Berth availability - days	350	350	350	350	350	350	days/yr	365 - #6a
28	**Berth occupancy (5.36 berths) +**	**75.2%**	**72.1%**	**75.9%**	84.5%	73.3%	73.3%		#26a/(#27xNo.berths)
29	Waiting time factor Tw/Tb assumed	0.248	0.195	0.260	0.412	0.208	0.208	s.chart	40% of random arrival
30	Annual waiting time Tw calculated *	350.6	49.3	301.3	121.9	106.7	72.7	d/y	#29x#26
31	**Avg. waiting time per vessel: Tw**	**1.61**	**0.78**	**1.94**	1.74	2.22	1.96	days	#30/#24
32	**Total Vessel Time in Port: Tb+Tw**	**8.08**	**4.79**	**9.42**	5.97	12.92	11.42	days	#22 + #31
33	**Port transfer rate**	**3,360**	**5,985**	**2,818**	4,637	2,092	2,084	t/day	#1a/#32

Note: + Berth occupancies Cargill & TCE #6S as per 2002; TCE #4S = 0.5x(66.1% inner+ 80.7% outer berth) = 73.3%
Number of "OTHER" berths is 1.36, if occupancy 73.3% is made equivalent to dual berth 4S;
Total theoretical number of berths is 1 at Cargill + 1 at 6S + 2 at 4S + 1.36 Other = 5.36 berths.
* Total time at anchorage in 2002 was 8,416 hours or 350.6 days or 1.61 days average for 218 vessels.

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Table B-3: Grain Unloading Throughput - Projected for 65% Occupancy

ITEM #	DESCRIPTION	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	CARGILL TOTAL LOW	CARGILL TOTAL HIGH	TCE TOTAL LOW	TCE TOTAL HIGH	B # 6 S LOW	B # 6 S HIGH	B # 4 S LOW	B # 4 S HIGH	OTHER TWO BERTHS LOW	OTHER TWO BERTHS HIGH		EXPLANATIONS
	Annual tonnage projected	**6.100**	**6.300**	**1.600**	**1.700**	**4.500**	**4.600**	1.800	1.840	1.350	1.380	1.350	1.380	mill.t	Input
1	**Average size of cargo**	**28,241**	**28,636**	**29,091**	**29,310**	**27,950**	**28,395**	27,692	27,879	28,125	28,750	28,125	28,750	tons	Input
2	Number of holds of vessel			5	5			5	5	5	5	5	5	holds	Input
3	Unloader design rate			500	500			250	250	250	250	250	250	t/h	Input
4a	Unloader interference factor			0.97	0.97			0.90	0.90	0.90	0.90	0.90	0.90	-	For several machines
4b	Truck transfer interference factor			1.00	1.00			1.00	1.00	0.35	0.35	0.35	0.35	-	For direct truck loading
5a	Number of unloaders			2	2			4	4	4	4	4	4	-	Input
5b	Design rate for number of unloaders			967	967			900	900	317	317	317	317	t/h	#3x#4ax4bx#5a
6a	Unavailable time at port (weather, maintenance)			15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	d/y	Input Assumption
6b	**Overall port availability**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**	96%	96%	96%	96%	96%	96%		(365 d - #6a)/365
	VESSEL TIME / EVENT														
7	Move vessel to berth and dock			1.0	1.0			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
8	Customs and paperwork			1.0	1.0			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
9	Vessel problems		Cargill	1.0	1.0		TCE	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
10	Unload cargo @ % of design rate:		38%	80.2	80.8		45%	68.6	69.1	197.7	202.1	197.7	202.1	hours	#1 / ([%]x#5b)
11	Hatch shifting 3 moves/hold [min]		10.0	1.3	1.3		10.0	0.6	0.6	0.6	0.6	0.6	0.6	h/unl.	3x[min]hx#2/(60x5a)
12	Frontloader moves/hold in or out [min]		20.0	1.7	1.7		20.0	0.8	0.8	0.8	0.8	0.8	0.8	h/unl.	2x[min]hx#2/(60x5a)
13	Unloader downtime of # 10,11,12:		5%	4.2	4.2		5%	3.5	3.5	10.0	10.2	10.0	10.2	hours	[%]x(#10+#11+#12)
14	Vessel shifting 2 moves/hold [h]:		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	hours	2 movesx[h]hx#2/5a
15	Downtime due to weather		5%	4.2	4.2		5%	3.5	3.5	10.0	10.2	10.0	10.2	hours	[%]x(#10+#11+#12)
16	Vessel time/draught survey			1.0	1.0			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
17	Vessel deberthing and transit time			2.0	2.0			2.0	2.0	2.0	2.0	2.0	2.0	hours	Assumption
18	Total berth time per vessel			97.4	98.1			83.1	83.6	225.1	229.9	225.1	229.9	hours	Sum#7 through #17
19	Average unloading rate @ berth time			299	299			333	333	125	125	125	125	t/h	#1/#18
20	Average berth unloading rate/design rate			31%	31%			37%	37%	39%	39%	39%	39%		100x(#19/#5b)
21	Operating hours per day (three shifts)			24.0	24.0			24.0	24.0	24.0	24.0	24.0	24.0	hours	Input Assumption
22	**Berth occupancy per vessel: Tb**	**6.24**	**6.30**	**4.06**	**4.09**	**6.99**	**7.10**	3.46	3.48	9.38	9.58	9.38	9.58	days	#18/#21
22a	**Berth transfer rate**	**4,523**	**4,543**	**7,165**	**7,170**	**3,999**	**4,001**	7,997	8,002	2,999	3,001	2,999	3,001	t/day	#1/#22
	ANNUAL PROJECTIONS:	**OVERALL TOTAL LOW**	**OVERALL TOTAL HIGH**	**CARGILL TOTAL LOW**	**CARGILL TOTAL HIGH**	**TCE TOTAL LOW**	**TCE TOTAL HIGH**	**B # 6 S LOW**	**B # 6 S HIGH**	**B # 4 S LOW [dual berth]**	**B # 4 S HIGH [dual berth]**	**OTHER TWO BERTHS LOW**	**OTHER TWO BERTHS HIGH**		
23	**Annual tonnage unloaded**	**6.100**	**6.300**	**1.600**	**1.700**	**4.500**	**4.600**	1.800	1.840	1.350	1.380	1.350	1.380	mill.t	Input
24	Number of vessels unloaded	216	220	55	58	161	162	65	66	48	48	48	48	vessels	#23/#1
25	Berth occupancy - hours	32,369	33,281	5,359	5,690	27,010	27,590	5,402	5,518	10,804	11,036	10,804	11,036	hours/y	24 hx#22x#24
26	Total berth occupancy - days	1,349	1,387	223	237	1,125	1,150	225	230	450	460	450	460	days/yr	#22x#24
27	Berth availability - days	350	350	350	350	350	350	350	350	350	350	350	350	days/yr	365 - #6a
28	**Berth occupancy (6 berths):**	**64.2%**	**66.0%**	**63.8%**	**67.7%**	**64.3%**	**65.7%**	64.3%	65.7%	64.3%	65.7%	64.3%	65.7%		#26a/(#27xNo.berths)
29	Waiting time factor Tw/Tb assumed	0.126	0.147	0.123	0.150	0.126	0.145	0.126	0.145	0.126	0.145	0.126	0.145	- ahead	40% of random arrivals

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Table B-4: Grain Unloading Throughput - Intermediate Step of Future Expansion

ITEM #	DESCRIPTION	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	CARGILL TOTAL LOW	CARGILL TOTAL HIGH	TCE TOTAL LOW	TCE TOTAL HIGH	B # 6 S LOW	B # 6 S HIGH	B # 5 N LOW	B # 5 N HIGH	B # 5 S LOW	B # 5 S HIGH		EXPLANATIONS
	Future annual tonnage first step	**7.750**	**8.060**	**2.800**	**3.000**	**4.950**	**5.060**	1.800	1.840	1.800	1.840	1.350	1.380	mill.t	Input
1	**Average size of cargo**	**28,285**	**28,582**	**29,167**	**29,412**	**27,809**	**28,111**	27,692	27,879	27,692	27,879	28,125	28,750	tons	Input
2	Number of holds of vessel			5	5			5	5	5	5	5	5	holds	Input
[	Unloader design rate			500	500			250	250	250	250	250	250	t/h	Input
4a	*Unloader interference factor*			*0.93*	*0.93*			*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	-	*For several machines*
4b	Truck transfer interference factor			1.00	1.00			1.00	1.00	1.00	1.00	0.35	0.35	-	For direct truck loading
5a	Number of unloaders			3	3			4	4	4	4	4	4	-	Input
5b	Design rate for number of unloaders			1,394	1,394			900	900	900	900	317	317	t/h	#3x#4ax4bx#5a
6a	Unavailable time at port (weather, maintenance)			15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	d/y	Input Assumption
6b	**Overall port availability**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**	96%	96%	96%	96%	96%	96%		(365 d - #6a)/365
	VESSEL TIME / EVENT														
7	Move vessel to berth and dock			1.0	1.0			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
8	Customs and paperwork			1.0	1.0	TCE	TCE	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
9	Vessel problems		Cargill	1.0	1.0	4S+6S	4N	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
10	Unload cargo @ % of design rate:		50%	41.9	42.2	45%	45%	68.6	69.1	68.6	69.1	197.7	202.1	hours	#1 / ([%]x#5b)
11	Hatch shifting 3 moves/hold [min]		10.0	0.8	0.8	10.0	10.0	0.6	0.6	0.6	0.6	0.6	0.6	h/unl.	3x[min]hx#2/(60x5a)
12	Frontloader moves/hold in or out [min]		20.0	1.1	1.1	20.0	20.0	0.8	0.8	0.8	0.8	0.8	0.8	h/unl.	2x[min]hx#2/(60x5a)
13	Unloader downtime of # 10,11,12:		5%	2.2	2.2	5%	5%	3.5	3.5	3.5	3.5	10.0	10.2	hours	[%]x(#10+#11+#12)
14	Vessel shifting 2 moves/hold [h]:		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	hours	2 movesx[h]hx#2/5a
15	*Downtime due to weather*		*5%*	*2.2*	*2.2*	*5%*	*5%*	*3.5*	*3.5*	*3.5*	*3.5*	*10.0*	*10.2*	*hours*	[%]x(#10+#11+#12)
16	Vessel time/draught survey			1.0	1.0			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
17	Vessel debertning and transit time			2.0	2.0			2.0	2.0	2.0	2.0	2.0	2.0	hours	Assumption
18	Total berth time per vessel			54.2	54.6			83.1	83.6	83.1	83.6	225.1	229.9	hours	Sum#7 through #17
19	Average unloading rate @ berth time			538	539			333	333	333	333	125	125	t/h	#1/#18
20	Average berth unloading rate/design rate			39%	39%			37%	37%	37%	37%	39%	39%		100x(#19/#5b)
21	Operating hours per day (three shifts)			24.0	24.0			24.0	24.0	24.0	24.0	24.0	24.0	hours	Input Assumption
22	**Berth occupancy per vessel: Tb**	**4.08**	**4.08**	**2.26**	**2.27**	**5.06**	**5.11**	3.46	3.48	3.46	3.48	9.38	9.58	days	#18/#21
22a	**Berth transfer rate**	**6,938**	**6,999**	**12,918**	**12,935**	**5,498**	**5,502**	7,997	8,002	7,997	8,002	2,999	3,001	t/day	#1/#22
	ANNUAL PROJECTIONS:	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	CARGILL TOTAL LOW	CARGILL TOTAL HIGH	TCE TOTAL LOW	TCE TOTAL HIGH	B # 6 S LOW	B # 6 S HIGH	B # 4 N LOW [single berth]	B # 4 N HIGH [single berth]	B # 4 S LOW [dual berth]	B # 4 S HIGH [dual berth]		
23	**Annual tonnage unloaded**	**7.750**	**8.060**	**2.800**	**3.000**	**4.950**	**5.060**	1.800	1.840	1.800	1.840	1.350	1.380	mill.t	Input
24	Number of vessels unloaded	274	282	96	102	178	180	65	66	65	66	48	48	vessels	#23/#1
25	Berth occupancy - hours	26,809	27,639	5,202	5,566	21,607	22,073	5,402	5,518	5,402	5,518	10,804	11,036	hours/yr	24 hx#22x#24
26	Total berth occupancy - days	1,117	1,152	217	232	900	920	225	230	225	230	450	460	days/yr	#22x#24
27	Berth availability - days	350	350	350	350	350	350	350	350	350	350	350	350	days/yr	365 - #6a
28	**Berth occupancy (5 berths):**	**63.8%**	**65.8%**	**61.9%**	**66.3%**	**64.3%**	**65.7%**	64.3%	65.7%	64.3%	65.7%	64.3%	65.7%		#26a/(#27xNo.berths)
29	Waiting time factor Tw/Tb assumed	0.134	0.146	0.123	0.149	0.136	0.145	0.136	0.145	0.136	0.145	0.136	0.145	s.chart	40% of random arrival
30	Annual waiting time Tw calculated	149.3	167.6	26.7	34.4	122.6	133.1	30.7	33.3	30.7	33.3	61.3	66.6	d/y	#29x#26
31	***Avg. waiting time per vessel: Tw***	***0.54***	***0.59***	***0.28***	***0.34***	***0.69***	***0.74***	*0.47*	*0.50*	*0.47*	*0.50*	*1.28*	*1.39*	*days*	#30/#24
32	**Total vessel time in port: Tb+Tw**	**4.62**	**4.68**	**2.54**	**2.61**	**5.75**	**5.85**	3.93	3.99	3.93	3.99	10.66	10.97	days	#22 + #31
33	**Port transfer rate**	**6,120**	**6,110**	**11,504**	**11,262**	**4,839**	**4,806**	7,039	6,990	7,039	6,990	2,639	2,622	t/day	#1a/#32

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Table B-5: Grain Unloading Throughput - First Step of Future Expansion

ITEM #	DESCRIPTION	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	CARGILL TOTAL LOW	CARGILL TOTAL HIGH	TCE TOTAL LOW	TCE TOTAL HIGH	B # 6 S LOW	B # 6 S HIGH	B # 5 N LOW	B # 5 N HIGH	B # 5 S LOW	B # 5 S HIGH		EXPLANATIONS
	Future annual tonnage first step	**9.550**	**10.120**	**2.800**	**3.000**	**6.750**	**7.120**	1.800	1.840	3.600	3.900	1.350	1.380	mill.t	Input
1	**Average size of cargo**	**28,338**	**28,832**	**29,167**	**29,412**	**28,008**	**28,594**	27,692	27,879	28,125	28,889	28,125	28,750	tons	Input
2	Number of holds of vessel			5	5			5	5	5	5	5	5	holds	Input
[	Unloader design rate			500	500			250	250	600	600	250	250	t/h	Input
4a	Unloader interference factor			0.93	0.93			0.90	0.90	0.78	0.78	0.90	0.90	-	For several machines
4b	Truck transfer interference factor			1.00	1.00			1.00	1.00	1.00	1.00	0.35	0.35	-	For direct truck loading
5a	Number of unloaders			3	3			4	4	3	3	4	4	-	Input
5b	Design rate for number of unloaders			1,394	1,394			900	900	1,395	1,395	317	317	t/h	#3x#4ax4bx#5a
6a	Unavailable time at port (weather, maintenance)			15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	d/y	Input Assumption
6b	**Overall port availability**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**	96%	96%	96%	96%	96%	96%		(365 d - #6a)/365
	VESSEL TIME / EVENT														
7	Move vessel to berth and dock			1.0	1.0			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
8	Customs and paperwork			1.0	1.0	TCE	TCE	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
9	Vessel problems		Cargill	1.0	1.0	4S+6S	4N	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
10	Unload cargo @ % of design rate:		50%	41.9	42.2	45%	70%	68.6	69.1	28.8	29.6	197.7	202.1	hours	#1 / ([%]x#5b)
11	Hatch shifting 3 moves/hold [min]		10.0	0.8	0.8	10.0	10.0	0.6	0.6	0.8	0.8	0.6	0.6	h/unl.	3x[min]hx#2/(60x5a)
12	*Frontloader moves/hold in or out [min]*		20.0	1.1	1.1	20.0	20.0	0.8	0.8	1.1	1.1	0.8	0.8	h/unl.	2x[min]hx#2/(60x5a)
13	Unloader downtime of # 10,11,12:		5%	2.2	2.2	5%	5%	3.5	3.5	1.5	1.6	10.0	10.2	hours	[%]x(#10+#11+#12)
14	Vessel shifting 2 moves/hold [h]:		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	hours	2 movesx[h]hx#2/5a
15	*Downtime due to weather*		5%	2.2	2.2	5%	5%	3.5	3.5	1.5	1.6	10.0	10.2	hours	[%]x(#10+#11+#12)
16	Vessel time/draught survey			1.0	1.0			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
17	Vessel deberthing and transit time			2.0	2.0			2.0	2.0	2.0	2.0	2.0	2.0	hours	Assumption
18	*Total berth time per vessel*			*54.2*	*54.6*			*83.1*	*83.6*	*39.8*	*40.7*	*225.1*	*229.9*	*hours*	Sum#7 through #17
19	Average unloading rate @ berth time			538	539			333	333	706	710	125	125	t/h	#1/#18
20	Average berth unloading rate/design rate			39%	39%			37%	37%	51%	51%	39%	39%		100x(#19/#5b)
21	Operating hours per day (three shifts)			*24.0*	*24.0*			*24.0*	*24.0*	*24.0*	*24.0*	*24.0*	*24.0*	*hours*	*Input Assumption*
22	**Berth occupancy per vessel: Tb**	**3.28**	**3.28**	**2.26**	**2.27**	**3.68**	**3.69**	3.46	3.48	1.66	1.70	9.38	9.58	days	#18/#21
22a	**Berth transfer rate**	**8,648**	**8,796**	**12,918**	**12,935**	**7,605**	**7,751**	7,997	8,002	16,951	17,043	2,999	3,001	t/day	#1/#22

	ANNUAL PROJECTIONS:	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	CARGILL TOTAL LOW	CARGILL TOTAL HIGH	TCE TOTAL LOW	TCE TOTAL HIGH	B # 6 S LOW	B # 6 S HIGH	B # 4 N LOW [single berth]	B # 4 N HIGH [single berth]	B # 4 S LOW [dual berth]	B # 4 S HIGH [dual berth]		
23	**Annual tonnage unloaded**	**9.550**	**10.120**	**2.800**	**3.000**	**6.750**	**7.120**	*1.800*	*1.840*	*3.600*	*3.900*	*1.350*	*1.380*	*mill.t*	*Input*
24	Number of vessels unloaded	337	351	96	102	241	249	65	66	128	135	48	48	vessels	#23/#1
25	Berth occupancy - hours	26,505	27,613	5,202	5,566	21,303	22,046	5,402	5,518	5,097	5,492	10,804	11,036	hours/y	24 hx#22x#24
26	Total berth occupancy - days	1,104	1,151	217	232	888	919	225	230	212	229	450	460	days/yr	#22x#24
27	Berth availability - days	350	350	350	350	350	350	350	350	350	350	350	350	days/yr	365 - #6a
28	**Berth occupancy (5 berths):**	**63.1%**	**65.7%**	**61.9%**	**66.3%**	**63.4%**	**65.6%**	64.3%	65.7%	60.7%	65.4%	64.3%	65.7%		#26a/(#27xNo.berths)
29	Waiting time factor Tw/Tb assumed	0.129	0.145	0.123	0.149	0.131	0.144	0.136	0.145	0.117	0.143	0.136	0.145	s.chart	*40% of random arrival*
30	Annual waiting time Tw calculated	142.9	167.0	26.7	34.4	116.2	132.5	30.7	33.3	24.8	32.7	61.3	66.6	d/y	#29x#26
31	**Avg. waiting time per vessel: Tw**	**0.42**	**0.48**	**0.28**	**0.34**	**0.48**	**0.53**	0.47	0.50	0.19	0.24	1.28	1.39	days	#30/#24
32	**Total vessel time in port: Tb+Tw**	**3.70**	**3.75**	**2.54**	**2.61**	**4.17**	**4.22**	3.93	3.99	1.85	1.94	10.66	10.97	days	#22 + #31
33	**Port transfer rate**	**7,657**	**7,681**	**11,504**	**11,262**	**6,724**	**6,774**	7,039	6,990	15,180	14,914	2,639	2,622	t/day	#1a/#32

USTDA APIVER Feasibility Study for the Veracruz Port Expansion Project

Table B-6: Grain Unloading Throughput - Second Step of Future Expansion

ITEM #	DESCRIPTION	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	CARGILL TOTAL LOW	CARGILL TOTAL HIGH	TCE TOTAL LOW	TCE TOTAL HIGH	B # 6 S LOW	B # 6 S HIGH	B # 5 N LOW	B # 5 N HIGH	B # 5 S LOW	B # 5 S HIGH		EXPLANATIONS
	Future annual tonnage sec.step	**11.800**	**12.640**	**2.800**	**3.000**	**9.000**	**9.640**	1.800	1.840	3.600	3.900	3.600	3.900	mill.t	Input
1	**Average size of cargo**	**28,297**	**28,858**	**29,167**	**29,412**	**28,037**	**28,690**	27,692	27,879	28,125	28,889	28,125	28,889	tons	Input
2	Number of holds of vessel			5	5			5	5	5	5	5	5	holds	Input
3	*Unloader design rate*			*500*	*500*			*250*	*250*	*600*	*600*	*600*	*600*	*t/h*	*Input*
4a	Unloader interference factor			0.93	0.93			0.90	0.90	0.78	0.78	0.78	0.78	-	For several machines
4b	Truck transfer interference factor			1.00	1.00			1.00	1.00	1.00	1.00	1.00	1.00	-	For direct truck loading
5a	Number of unloaders			3	3			4	4	3	3	3	3	-	Input
5b	Design rate for number of unloaders			1,394	1,394			900	900	1,395	1,395	1,395	1,395	t/h	#3x#4ax4bx#5a
6a	Unavailable time at port (weather, maintenance)			15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	d/y	Input Assumption
6b	**Overall port availability**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**	96%	96%	96%	96%	96%	96%		(365 d - #6a)/365
	VESSEL TIME / EVENT														
7	Move vessel to berth and dock			1.0	1.0			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
8	Customs and paperwork			1.0	1.0	TCE	TCE	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
9	Vessel problems		Cargill	1.0	1.0	6S	4N+4S	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
10	Unload cargo @ % of design rate:		50%	41.9	42.2	45%	70%	68.6	69.1	28.8	29.6	28.8	29.6	hours	#1 / ([%]x#5b)
11	Hatch shifting 3 moves/hold [min]		10.0	0.8	0.8	10.0	10.0	0.6	0.6	0.8	0.8	0.8	0.8	h/unl.	3x[min]hx#2/(60x5a)
12	Frontloader moves/hold in or out [min]		*20.0*	*1.1*	*1.1*	*20.0*	*20.0*	*0.8*	*0.8*	*1.1*	*1.1*	*1.1*	*1.1*	*h/unl.*	*2x[min]hx#2/(60x5a)*
13	Unloader downtime of # 10,11,12:		5%	2.2	2.2	5%	5%	3.5	3.5	1.5	1.6	1.5	1.6	hours	[%]x(#10+#11+#12)
14	Vessel shifting 2 moves/hold [h]:		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	hours	2 movesx[h]hx#2/5a
15	*Downtime due to weather*		*5%*	*2.2*	*2.2*	*5%*	*5%*	*3.5*	*3.5*	*1.5*	*1.6*	*1.5*	*1.6*	*hours*	*[%]x(#10+#11+#12)*
16	Vessel time/draught survey			1.0	1.0			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
17	Vessel deberthing and transit time			2.0	2.0			2.0	2.0	2.0	2.0	2.0	2.0	hours	Assumption
18	Total berth time per vessel			54.2	54.6			83.1	83.6	39.8	40.7	39.8	40.7	hours	Sum#7 through #17
19	Average unloading rate @ berth time			538	539			333	333	706	710	706	710	t/h	#1/#18
20	Average berth unloading rate/design rate			39%	39%			37%	37%	51%	51%	51%	51%		100x(#19/#5b)
21	Operating hours per day (three shifts)			24.0	24.0			24.0	24.0	24.0	24.0	24.0	24.0	hours	Input Assumption
22	**Berth occupancy per vessel: Tb**	**2.08**	**2.10**	**2.26**	**2.27**	**2.02**	**2.05**	3.46	3.48	1.66	1.70	1.66	1.70	days	#18/#21
22a	**Berth transfer rate**	**13,617**	**13,746**	**12,918**	**12,935**	**13,850**	**14,020**	7,997	8,002	16,951	17,043	16,951	17,043	t/day	#1/#22
	ANNUAL PROJECTIONS:	**OVERALL TOTAL LOW**	**OVERALL TOTAL HIGH**	**CARGILL TOTAL LOW**	**CARGILL TOTAL HIGH**	**TCE TOTAL LOW**	**TCE TOTAL HIGH**	**B # 6 S LOW**	**B # 6 S HIGH**	**B # 4 N LOW [single berth]**	**B # 4 N HIGH [single berth]**	**B # 4 S LOW [one berth]**	**B # 4 S HIGH [one berth]**		
23	**Annual tonnage unloaded**	**11.800**	**12.640**	**2.800**	**3.000**	**9.000**	**9.640**	1.800	1.840	3.600	3.900	3.600	3.900	mill.t	Input
24	Number of vessels unloaded	417	438	96	102	321	336	65	66	128	135	128	135	vessels	#23/#1
25	Berth occupancy - hours	20,798	22,069	5,202	5,566	15,596	16,502	5,402	5,518	5,097	5,492	5,097	5,492	hours/y	24 hx#22x#24
26	Total berth occupancy - days	867	920	217	232	650	688	225	230	212	229	212	229	days/yr	#22x#24
27	Berth availability - days	350	350	350	350	350	350	350	350	350	350	350	350	days/yr	365 - #6a
28	**Berth occupancy (4 berths):**	**61.9%**	**65.7%**	**61.9%**	**66.3%**	**61.9%**	**65.5%**	64.3%	65.7%	60.7%	65.4%	60.7%	65.4%		*#26a/(#27xNo.berths)*
29	Waiting time factor Tw/Tb assumed	0.123	0.145	0.123	0.149	0.123	0.143	0.136	0.145	0.117	0.143	0.117	0.143	s.chart	40% of random arrival
30	Annual waiting time Tw calculated	106.4	133.1	26.7	34.4	79.8	98.6	30.7	33.3	24.8	32.7	24.8	32.7	d/y	#29x#26
31	***Avg. waiting time per vessel: Tw***	**0.26**	**0.30**	**0.28**	**0.34**	**0.25**	**0.29**	0.47	0.50	0.19	0.24	0.19	0.24	days	#30/#24
32	**Total vessel time in port: Tb+Tw**	**2.33**	**2.40**	**2.54**	**2.61**	**2.27**	**2.34**	3.93	3.99	1.85	1.94	1.85	1.94	days	#22 + #31
33	**Port transfer rate**	**12,127**	**12,008**	**11,504**	**11,262**	**12,335**	**12,261**	7,039	6,990	15,180	14,914	15,180	14,914	t/day	#1a/#32

USTDA APIVER Feasibility Study for the Veracruz Port Expansion Project

Table B-7: Grain Unloading Throughput - Third Step of Future Expansion

ITEM #	DESCRIPTION	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	CARGILL TOTAL LOW	CARGILL TOTAL HIGH	TCE TOTAL LOW	TCE TOTAL HIGH	B # 6 S LOW	B # 6 S HIGH	B # 5 N LOW	B # 5 N HIGH	B # 5 S LOW	B # 5 S HIGH		EXPLANATIONS
	Future annual tonnage third step	**13.450**	**14.390**	**2.800**	**3.000**	**10.650**	**11.390**	1.800	1.840	3.600	3.900	5.250	5.650	mill.t	Input
1	**Average size of cargo**	**28,316**	**28,954**	**29,167**	**29,412**	**28,100**	**28,835**	27,692	27,879	28,125	28,889	28,226	29,124	tons	Input
2	Number of holds of vessel			5	5			5	5	5	5	5	5	holds	Input
3	Unloader design rate			500	500			250	250	600	600	600	600	t/h	Input
4a	Unloader interference factor			0.93	0.93			0.90	0.90	0.78	0.78	0.73	0.73	-	For several machines
4b	Truck transfer interference factor			1.00	1.00			1.00	1.00	1.00	1.00	1.00	1.00	-	For direct truck loading
5a	Number of unloaders			3	3			4	4	3	3	5	5	-	Input
5b	Design rate for number of unloaders			1,394	1,394			900	900	1,395	1,395	2,175	2,175	t/h	#3x#4ax4bx#5a
6a	Unavailable time at port (weather, maintenance)			15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	d/y	Input Assumption
6b	**Overall port availability**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**	96%	96%	96%	96%	96%	96%		(365 d - #6a)/365
	VESSEL TIME / EVENT														
7	Move vessel to berth and dock			1.0	1.0			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
8	Customs and paperwork			1.0	1.0	TCE	TCE	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
9	Vessel problems		Cargill	1.0	1.0	6S	4N+4S	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
10	Unload cargo @ % of design rate:		50%	41.9	42.2	45%	70%	68.6	69.1	28.8	29.6	18.5	19.1	hours	#1 / ([%]x#5b)
11	Hatch shifting 3 moves/hold [min]		10.0	0.8	0.8	10.0	10.0	0.6	0.6	0.8	0.8	0.5	0.5	h/unl.	3x[min]hx#2/(60x5a)
12	Frontloader moves/hold in or out [min]		20.0	1.1	1.1	20.0	20.0	0.8	0.8	1.1	1.1	0.7	0.7	h/unl.	2x[min]hx#2/(60x5a)
13	Unloader downtime of # 10,11,12:		5%	2.2	2.2	5%	5%	3.5	3.5	1.5	1.6	1.0	1.0	hours	[%]x(#10+#11+#12)
14	Vessel shifting 2 moves/hold [h]:		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	hours	2 movesx[h]hx#2/5a
15	Downtime due to weather		5%	2.2	2.2	5%	5%	3.5	3.5	1.5	1.6	1.0	1.0	hours	[%]x(#10+#11+#12)
16	Vessel time/draught survey			1.0	1.0			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
17	Vessel deberthing and transit time			2.0	2.0			2.0	2.0	2.0	2.0	2.0	2.0	hours	Assumption
18	Total berth time per vessel			54.2	54.6			83.1	83.6	39.8	40.7	27.7	28.3	hours	Sum#7 through #17
19	Average unloading rate @ berth time			538	539			333	333	706	710	1,020	1,028	t/h	#1/#18
20	Average berth unloading rate/design rate			39%	39%			37%	37%	51%	51%	47%	47%		100x(#19/#5b)
21	Operating hours per day (three shifts)			24.0	24.0			24.0	24.0	24.0	24.0	24.0	24.0	hours	Input Assumption
22	**Berth occupancy per vessel: Tb**	**1.83**	**1.85**	**2.26**	**2.27**	**1.72**	**1.74**	3.46	3.48	1.66	1.70	1.15	1.18	days	#18/#21
22a	**Berth transfer rate**	**15,483**	**15,647**	**12,918**	**12,935**	**16,336**	**16,562**	7,997	8,002	16,951	17,043	24,476	24,677	t/day	#1/#22
	ANNUAL PROJECTIONS:	**OVERALL TOTAL LOW**	**OVERALL TOTAL HIGH**	**CARGILL TOTAL LOW**	**CARGILL TOTAL HIGH**	**TCE TOTAL LOW**	**TCE TOTAL HIGH**	**B # 6 S LOW**	**B # 6 S HIGH**	**B # 4 N LOW [single berth]**	**B # 4 N HIGH [single berth]**	**B # 4 S LOW [one berth]**	**B # 4 S HIGH [one berth]**		
23	**Annual tonnage unloaded**	**13.450**	**14.390**	**2.800**	**3.000**	**10.650**	**11.390**	1.800	1.840	3.600	3.900	5.250	5.650	mill.t	Input
24	Number of vessels unloaded	475	497	96	102	379	395	65	66	128	135	186	194	vessels	#23/#1
25	Berth occupancy - hours	20,848	22,072	5,202	5,566	15,647	16,505	5,402	5,518	5,097	5,492	5,148	5,495	hours/yr	24 hx#22x#24
26	Total berth occupancy - days	869	920	217	232	652	688	225	230	212	229	214	229	days/yr	#22x#24
27	Berth availability - days	350	350	350	350	350	350	350	350	350	350	350	350	days/yr	365 - #6a
28	**Berth occupancy (4 berths):**	**62.0%**	**65.7%**	**61.9%**	**66.3%**	**62.1%**	**65.5%**	64.3%	65.7%	60.7%	65.4%	61.3%	65.4%		#26a/(#27xNo.berths)
29	Waiting time factor Tw/Tb assumed	0.124	0.145	0.123	0.149	0.124	0.144	0.136	0.145	0.117	0.143	0.120	0.143	s.chart	40% of random arrival
30	Annual waiting time Tw calculated	107.4	133.1	26.7	34.4	80.7	98.7	30.7	33.3	24.8	32.7	25.7	32.7	d/y	#29x#26
31	**Avg. waiting time per vessel: Tw**	**0.23**	**0.27**	**0.28**	**0.34**	**0.21**	**0.25**	0.47	0.50	0.19	0.24	0.14	0.17	days	#30/#24
32	**Total vessel time in port: Tb+Tw**	**2.05**	**2.12**	**2.54**	**2.61**	**1.93**	**1.99**	3.93	3.99	1.85	1.94	1.29	1.35	days	#22 + #31
33	**Port transfer rate**	**13,780**	**13,668**	**11,504**	**11,262**	**14,536**	**14,483**	7,039	6,990	15,180	14,914	21,861	21,589	t/day	#1a/#32

USTDA APIVER Feasibility Study for the Veracruz Port Expansion Project

Table B-8: Grain Unloading Throughput - Fourth Step of Future Expansion

ITEM #	DESCRIPTION	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	CARGILL TOTAL LOW	CARGILL TOTAL HIGH	TCE TOTAL LOW	TCE TOTAL HIGH	B # 6 S LOW	B # 6 S HIGH	B # 5 N LOW	B # 5 N HIGH	B # 5 S LOW	B # 5 S HIGH		EXPLANATIONS
	Future annual tonnage fourth step	**15.250**	**16.450**	**2.800**	**3.000**	**12.450**	**13.450**	3.600	3.900	3.600	3.900	5.250	5.650	mill.t	Input
1	**Average size of cargo**	**28,346**	**29,064**	**29,167**	**29,412**	**28,167**	**28,987**	28,125	28,889	28,125	28,889	28,226	29,124	tons	Input
2	Number of holds of vessel			5	5			5	5	5	5	5	5	holds	Input
3	Unloader design rate			500	500			500	500	600	600	600	600	t/h	Input
4a	Unloader interference factor			0.93	0.93			0.93	0.93	0.78	0.78	0.73	0.73	-	For several machines
4b	Truck transfer interference factor			1.00	1.00			1.00	1.00	1.00	1.00	1.00	1.00	-	For direct truck loading
5a	Number of unloaders			3	3			3	3	3	3	5	5	-	Input
5b	Design rate for number of unloaders			1,394	1,394			1,395	1,395	1,395	1,395	2,175	2,175	t/h	#3x#4ax4bx#5a
6a	Unavailable time at port (weather, maintenance)			15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	d/y	Input Assumption
6b	**Overall port availability**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**	96%	96%	96%	96%	96%	96%		(365 d - #6a)/365
	VESSEL TIME / EVENT														
7	Move vessel to berth and dock			1.0	1.0			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
8	Customs and paperwork			1.0	1.0		TCE	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
9	Vessel problems		Cargill	1.0	1.0		ALL	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
10	Unload cargo @ % of design rate:		50%	41.9	42.2		70%	28.8	29.6	28.8	29.6	18.5	19.1	hours	#1 / ((%)x#5b)
11	Hatch shifting 3 moves/hold [min]		10.0	0.8	0.8		10.0	0.8	0.8	0.8	0.8	0.5	0.5	h/unl.	3x[min]hx#2/(60x5a)
12	Frontloader moves/hold in or out [min]		20.0	1.1	1.1		20.0	1.1	1.1	1.1	1.1	0.7	0.7	h/unl.	2x[min]hx#2/(60x5a)
13	Unloader downtime of # 10,11,12:		5%	2.2	2.2		5%	1.5	1.6	1.5	1.6	1.0	1.0	hours	[%]x(#10+#11+#12)
14	Vessel shifting 2 moves/hold [h]:		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	hours	2 movesx[h]hx#2/5a
15	Downtime due to weather		5%	2.2	2.2		5%	1.5	1.6	1.5	1.6	1.0	1.0	hours	[%]x(#10+#11+#12)
16	Vessel time/draught survey			1.0	1.0			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
17	Vessel deberthing and transit time			2.0	2.0			2.0	2.0	2.0	2.0	2.0	2.0	hours	Assumption
18	Total berth time per vessel			54.2	54.6			39.8	40.7	39.8	40.7	27.7	28.3	hours	Sum#7 through #17
19	Average unloading rate @ berth time			538	539			706	710	706	710	1,020	1,028	t/h	#1/#18
20	Average berth unloading rate/design rate			39%	39%			51%	51%	51%	51%	47%	47%		100x(#19/#5b)
21	Operating hours per day (three shifts)			24.0	24.0			24.0	24.0	24.0	24.0	24.0	24.0	hours	Input Assumption
22	**Berth occupancy per vessel: Tb**	**1.59**	**1.62**	**2.26**	**2.27**	**1.45**	**1.48**	1.66	1.70	1.66	1.70	1.15	1.18	days	#18/#21
22a	**Berth transfer rate**	**17,816**	**17,908**	**12,918**	**12,935**	**19,476**	**19,589**	16,951	17,043	16,951	17,043	24,476	24,677	t/day	#1/#22
	ANNUAL PROJECTIONS:	**OVERALL TOTAL LOW**	**OVERALL TOTAL HIGH**	**CARGILL TOTAL LOW**	**CARGILL TOTAL HIGH**	**TCE TOTAL LOW**	**TCE TOTAL HIGH**	**B # 6 S LOW**	**B # 6 S HIGH**	**B # 4 N LOW [single berth]**	**B # 4 N HIGH [single berth]**	**B # 4 S LOW [one berth]**	**B # 4 S HIGH [one berth]**		
23	**Annual tonnage unloaded**	**15.250**	**16.450**	**2.800**	**3.000**	**12.450**	**13.450**	3.600	3.900	3.600	3.900	5.250	5.650	mill.t	Input
24	Number of vessels unloaded	538	566	96	102	442	464	128	135	128	135	186	194	vessels	#23/#1
25	Berth occupancy - hours	20,544	22,045	5,202	5,566	15,342	16,479	5,097	5,492	5,097	5,492	5,148	5,495	hours/yr	24 hx#22x#24
26	Total berth occupancy - days	856	919	217	232	639	687	212	229	212	229	214	229	days/yr	#22x#24
27	Berth availability - days	350	350	350	350	350	350	350	350	350	350	350	350	days/yr	365 - #6a
28	**Berth occupancy (4 berths):**	**61.1%**	**65.6%**	**61.9%**	**66.3%**	**60.9%**	**65.4%**	60.7%	65.4%	60.7%	65.4%	61.3%	65.4%		#26a/(#27xNo.berths)
29	Waiting time factor Tw/Tb assumed	0.119	0.144	0.123	0.149	0.118	0.143	0.117	0.143	0.117	0.143	0.120	0.143	s.chart	40% of random arrival
30	Annual waiting time Tw calculated	101.9	132.5	26.7	34.4	75.2	98.1	24.8	32.7	24.8	32.7	25.7	32.7	d/y	#29x#26
31	**Avg. waiting time per vessel: Tw**	**0.19**	**0.23**	**0.28**	**0.34**	**0.17**	**0.21**	0.19	0.24	0.19	0.24	0.14	0.17	days	#30/#24
32	**Total vessel time in port: Tb+Tw**	**1.78**	**1.86**	**2.54**	**2.61**	**1.62**	**1.69**	1.85	1.94	1.85	1.94	1.29	1.35	days	#22 + #31
33	**Port transfer rate**	**15,921**	**15,650**	**11,504**	**11,262**	**17,426**	**17,140**	15,180	14,914	15,180	14,914	21,861	21,589	t/day	#1a/#32

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June 17, 2005
by: K.Kroeter

USTDA APIVER Feasibility Study for the Veracruz Port Expansion Project

Table B-9: Grain Unloading Throughput - Fifth Step of Future Expansion

ITEM #	DESCRIPTION	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	CARGILL TOTAL LOW	CARGILL TOTAL HIGH	TCE TOTAL LOW	TCE TOTAL HIGH	B # 6 S LOW	B # 6 S HIGH	B # 5 N LOW	B # 5 N HIGH	B # 5 S LOW	B # 5 S HIGH
	Future annual tonnage fifth step	**29.650**	**32.050**	**2.800**	**3.000**	**12.450**	**13.450**	3.600	3.900	3.600	3.900	5.250	5.650
1	**Average size of cargo**	**28,238**	**28,978**	**29,167**	**29,412**	**28,167**	**28,987**	28,125	28,889	28,125	28,889	28,226	29,124
2	Number of holds of vessel			5	5			5	5	5	5	5	5
3	Unloader design rate			500	500			500	500	600	600	600	600
4a	Unloader interference factor			0.93	0.93			0.93	0.93	0.78	0.78	0.73	0.73
4b	Truck transfer interference factor			1.00	1.00			1.00	1.00	1.00	1.00	1.00	1.00
5a	Number of unloaders			3	3			3	3	3	3	5	5
5b	Design rate for number of unloaders			1,394	1,394			1,395	1,395	1,395	1,395	2,175	2,175
6a	Unavailable time at port (weather, maintenance)			15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
6b	**Overall port availability**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**	96%	96%	96%	96%	96%	96%
	VESSEL TIME / EVENT												
7	Move vessel to berth and dock			1.0	1.0			1.0	1.0	1.0	1.0	1.0	1.0
8	Customs and paperwork			1.0	1.0		TCE	1.0	1.0	1.0	1.0	1.0	1.0
9	Vessel problems		Cargill	1.0	1.0		ALL	1.0	1.0	1.0	1.0	1.0	1.0
10	Unload cargo @ % of design rate:		50%	41.9	42.2		70%	28.8	29.6	28.8	29.6	18.5	19.1
11	Hatch shifting 3 moves/hold [min]		10.0	0.8	0.8		10.0	0.8	0.8	0.8	0.8	0.5	0.5
12	Frontloader moves/hold in or out [min]		20.0	1.1	1.1		20.0	1.1	1.1	1.1	1.1	0.7	0.7
13	Unloader downtime of # 10,11,12:		5%	2.2	2.2		5%	1.5	1.6	1.5	1.6	1.0	1.0
14	Vessel shifting 2 moves/hold [h]:		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	Downtime due to weather		5%	2.2	2.2		5%	1.5	1.6	1.5	1.6	1.0	1.0
16	Vessel time/draught survey			1.0	1.0			1.0	1.0	1.0	1.0	1.0	1.0
17	Vessel deberthing and transit time			2.0	2.0			2.0	2.0	2.0	2.0	2.0	2.0
18	Total berth time per vessel			54.2	54.6			39.8	40.7	39.8	40.7	27.7	28.3
19	Average unloading rate @ berth time			538	539			706	710	706	710	1,020	1,028
20	Average berth unloading rate/design rate			39%	39%			51%	51%	51%	51%	47%	47%
21	Operating hours per day (three shifts)			24.0	24.0			24.0	24.0	24.0	24.0	24.0	24.0
22	**Berth occupancy per vessel: Tb**	**1.62**	**1.66**	**2.26**	**2.27**	**1.45**	**1.48**	1.66	1.70	1.66	1.70	1.15	1.18
22a	**Berth transfer rate**	**17,385**	**17,476**	**12,918**	**12,935**	**19,476**	**19,589**	16,951	17,043	16,951	17,043	24,476	24,677
	ANNUAL PROJECTIONS:	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	CARGILL TOTAL LOW	CARGILL TOTAL HIGH	TCE TOTAL LOW	TCE TOTAL HIGH	B # 6 S LOW	B # 6 S HIGH	B # 4 N LOW [single berth]	B # 4 N HIGH [single berth]	B # 4 S LOW [one berth]	B # 4 S HIGH [one berth]
23	**Annual tonnage unloaded**	**29.650**	**32.050**	**2.800**	**3.000**	**12.450**	**13.450**	3.600	3.900	3.600	3.900	5.250	5.650
24	Number of vessels unloaded	1050	1106	96	102	442	464	128	135	128	135	186	194
25	Berth occupancy - hours	40,932	44,013	5,202	5,566	15,342	16,479	5,097	5,492	5,097	5,492	5,148	5,495
26	Total berth occupancy - days	1,706	1,834	217	232	639	687	212	229	212	229	214	229
27	Berth availability - days	350	350	350	350	350	350	350	350	350	350	350	350
28	**Berth occupancy (8 berths):**	**60.9%**	**65.5%**	**61.9%**	**66.3%**	**60.9%**	**65.4%**	60.7%	65.4%	60.7%	65.4%	61.3%	65.4%
29	Waiting time factor Tw/Tb assumed	0.118	0.144	0.123	0.149	0.118	0.143	0.117	0.143	0.117	0.143	0.120	0.143
30	Annual waiting time Tw calculated	201.0	263.2	26.7	34.4	75.2	98.1	24.8	32.7	24.8	32.7	25.7	32.7
31	**Avg. waiting time per vessel: Tw**	**0.19**	**0.24**	**0.28**	**0.34**	**0.17**	**0.21**	0.19	0.24	0.19	0.24	0.14	0.17
32	**Total vessel time in port: Tb+Tw**	**1.82**	**1.90**	**2.54**	**2.61**	**1.62**	**1.69**	1.85	1.94	1.85	1.94	1.29	1.35
33	**Port transfer rate**	**15,552**	**15,283**	**11,504**	**11,262**	**17,426**	**17,140**	15,180	14,914	15,180	14,914	21,861	21,589

NEW PORT

NEW TERMINAL TOTAL LOW	NEW TERMINAL TOTAL HIGH	NEW JETTY "A" N" LOW	NEW JETTY "A" N" HIGH	NEW JETTY "A" S" LOW	NEW JETTY "A" S" HIGH	NEW JETTY "B" N" LOW	NEW JETTY "B" N" HIGH	NEW JETTY "B" S" LOW	NEW JETTY "B" S" HIGH		EXPLANATIONS
14.400	**15.600**	3.600	3.900	3.600	3.900	3.600	3.900	3.600	3.900	mill.t	Input
28,125	**28,889**	28,125	28,889	28,125	28,889	28,125	28,889	28,125	28,889	tons	Input
		5	5	5	5	5	5	5	5	holds	Input
		500	500	500	500	500	500	500	500	t/h	Input
		0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	-	For several machines
		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	For direct truck loading
		3	3	3	3	3	3	3	3	-	Input
		1,395	1,395	1,395	1,395	1,395	1,395	1,395	1,395	t/h	#3x#4ax4bx#5a
15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	d/y	Input Assumption
96%	**96%**	96%	96%	96%	96%	96%	96%	96%	96%		(365 d - #6a)/365
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
	NEW	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
	PORT	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
	70%	28.8	29.6	28.8	29.6	28.8	29.6	28.8	29.6	hours	#1 / ((%)x#5b)
	10.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	h/unl.	3x[min]hx#2/(60x5a)
	20.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	h/unl.	2x[min]hx#2/(60x5a)
	5%	1.5	1.6	1.5	1.6	1.5	1.6	1.5	1.6	hours	[%]x(#10+#11+#12)
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	hours	2 movesx[h]hx#2/5a
	5%	1.5	1.6	1.5	1.6	1.5	1.6	1.5	1.6	hours	[%]x(#10+#11+#12)
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	hours	Assumption
		39.8	40.7	39.8	40.7	39.8	40.7	39.8	40.7	hours	Sum#7 through #17
		706	710	706	710	706	710	706	710	t/h	#1/#18
		51%	51%	51%	51%	51%	51%	51%	51%		100x(#19/#5b)
		24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	hours	Input Assumption
1.66	**1.70**	1.66	1.70	1.66	1.70	1.66	1.70	1.66	1.70	days	#18/#21
16,951	**17,043**	16,951	17,043	16,951	17,043	16,951	17,043	16,951	17,043	t/day	#1/#22
NEW TERMINAL TOTAL LOW	NEW TERMINAL TOTAL HIGH	NEW JETTY "A" N" LOW	NEW JETTY "A" N" HIGH	NEW JETTY "A" S" LOW	NEW JETTY "A" S" HIGH	NEW JETTY "B" N" LOW	NEW JETTY "B" N" HIGH	NEW JETTY "B" S" LOW	NEW JETTY "B" S" HIGH		
14.400	**15.600**	3.600	3.900	3.600	3.900	3.600	3.900	3.600	3.900	mill.t	Input
512	540	128	135	128	135	128	135	128	135	vessels	#23/#1
20,388	21,968	5,097	5,492	5,097	5,492	5,097	5,492	5,097	5,492	hours/y	24 hx#22x#24
850	915	212	229	212	229	212	229	212	229	days/yr	#22x#24
350	350	350	350	350	350	350	350	350	350	days/yr	365 - #6a
60.7%	**65.4%**	60.7%	65.4%	60.7%	65.4%	60.7%	65.4%	60.7%	65.4%		#26a/(#27xNo.berths)
0.117	0.143	0.117	0.143	0.117	0.143	0.117	0.143	0.117	0.143	s.chart	40% of random arrival
99.1	130.7	24.8	32.7	24.8	32.7	24.8	32.7	24.8	32.7	d/y	#29x#26
0.19	**0.24**	0.19	0.24	0.19	0.24	0.19	0.24	0.19	0.24	days	#30/#24
1.85	**1.94**	1.85	1.94	1.85	1.94	1.85	1.94	1.85	1.94	days	#22 + #31
15,180	**14,914**	15,180	14,914	15,180	14,914	15,180	14,914	15,180	14,914	t/day	#1a/#32

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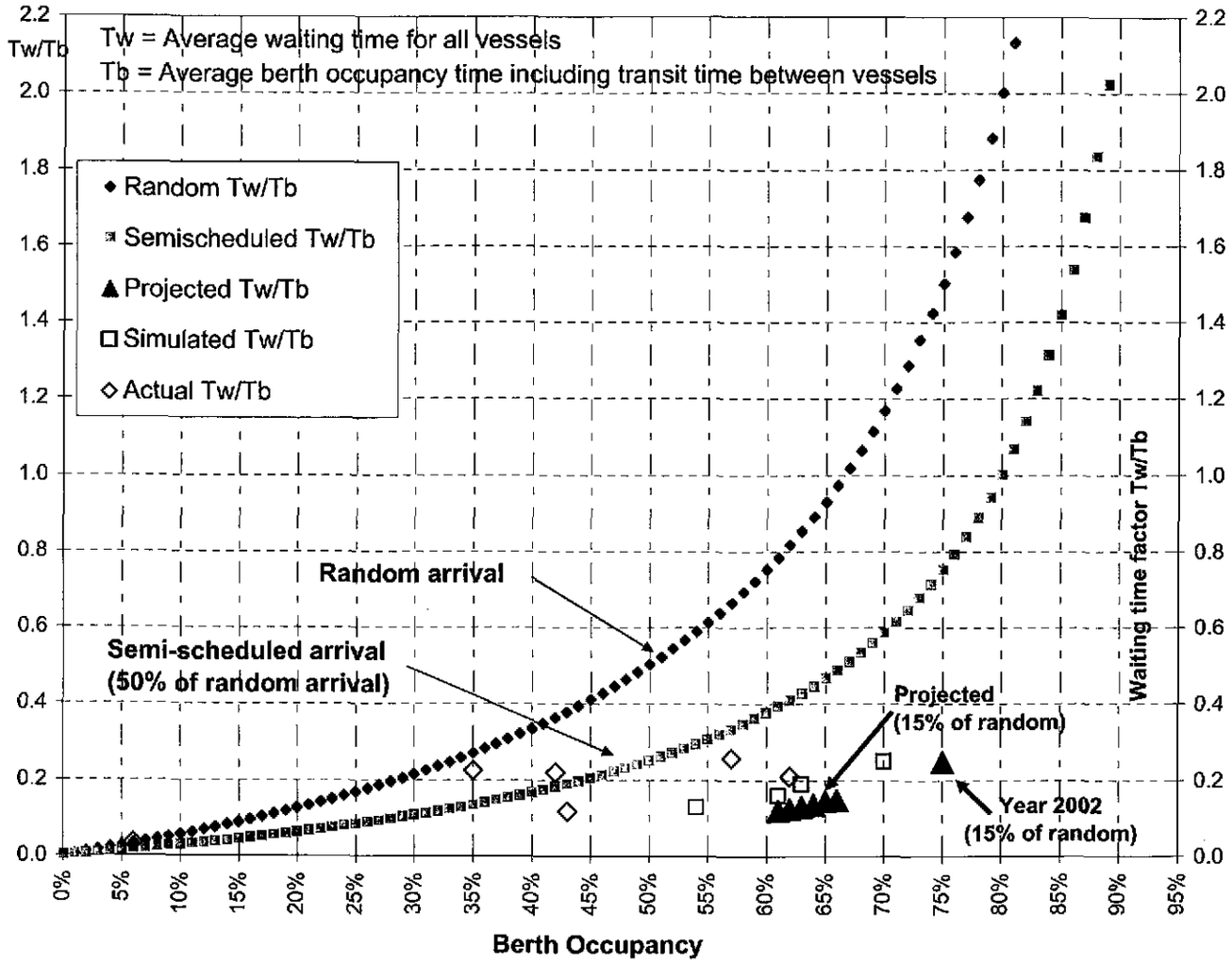
Figure No. B-10: Berth - Waiting Time Factors Tw/Tb at % Berth Occupancy - Year 2002 and Projections



Grain Unloading	2002	Projected for 65% Port Total		First Step Port Total		Second Step Port Total		Third Step Port Total		Fourth Step Port Total		Fifth Step Port Total	
	Total	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Throughput million tpy	5.920	6.100	6.300	9.550	10.120	11.800	12.640	13.450	14.390	15.250	16.450	29.650	32.050
Average cargo size t	27,154	28,241	28,636	28,338	28,832	28,297	28,858	28,316	28,954	28,346	29,064	28,238	28,978
Number of Vessels	218	216	220	337	351	417	438	475	497	538	566	1,050	1,106
Berth Occupancy %	**75%**	**64%**	**66%**	**63%**	**66%**	**62%**	**66%**	**62%**	**66%**	**61%**	**66%**	**61%**	**65%**
Waiting Tw days	1.61	0.85	0.93	0.42	0.48	0.26	0.30	0.23	0.27	0.19	0.23	0.19	0.24
Berthing Tb days	6.47	6.24	6.30	3.28	3.28	2.08	2.10	1.83	1.85	1.59	1.62	1.62	1.66
Projected Tw/Tb	**0.248**	**0.136**	**0.147**	**0.129**	**0.145**	**0.123**	**0.145**	**0.124**	**0.145**	**0.119**	**0.144**	**0.118**	**0.144**
Previous Projects													
Berth Occupancy %	54%	61%	63%	70%									
Simulated Tw/Tb	0.130	0.160	0.190	0.250									
Previous Projects					VENT3	VENT2	VENT5	ECT95	ECT94	KENAI			
Berth Occupancy %					6%	35%	43%	42%	62%	57%			
Actual Tw/Tb					0.035	0.225	0.117	0.220	0.210	0.258			

Table B-11: Description of Figure No. B-10

The chart is based on statistical equations.* The ratio of average waiting time Tw over average berthing time Tb of all vessels over one year is shown as a function of the berth occupancy percentage.

Two equations (Tw/Tb) related to % berth occupancy have been plotted:
• One for random arrival of vessels
• One for semi-scheduled arrival of vessels [values Tw/Tb equal to 50% of random values]

As can be seen from Figure C-0, the waiting time factor increases exponentially for both functions as the berth occupancy reaches values above 65%. This means that berth occupancies above 65% will result in significantly higher ship waiting times and higher demurrage costs.

It can also be noted that a higher degree of scheduling of vessel arrivals will lead to less vessel waiting time, which would make higher berth occupancies possible at tolerable vessel waiting times. Waiting time is also a function of the number of berths. The more berths are available in a port, the lower the statistical waiting time.

The chart shows plotted entries of actual operations from previous projects as "ACTUAL Tw / Tb". Results of previous computer simulations for various projects are also shown. These are identified as "SIMULATED Tw/Tb". Most of these simulations were based on a higher degree of scheduled vessel arrivals. Especially for higher berth occupancies they show waiting time factors Tw/Tb significantly below the 50% semi-scheduled arrival pattern.

For this project in 2002, the average waiting time Tw was 1.61 days/vessel and the average berth time Tb was 6.47 days per vessel unloading grain with berth occupancies ranging from 72.1 to 84.5%; average 75.2% at more than 5 berths. When this Tw/Tb = 0.248 was entered into the chart C-0, it was determined that the vessel arrival pattern had a 15% degree of scheduling. This scheduled arrival pattern [Tw/Tb is equal to 15% of random arrival values] has been used for all future operations at the existing and new facilities.

* Note: Equations were developed by J.D. Mettam, as published in
THE DOCK & HARBOUR AUTHORITY - APRIL 1967 - PAGES 380 T0 382

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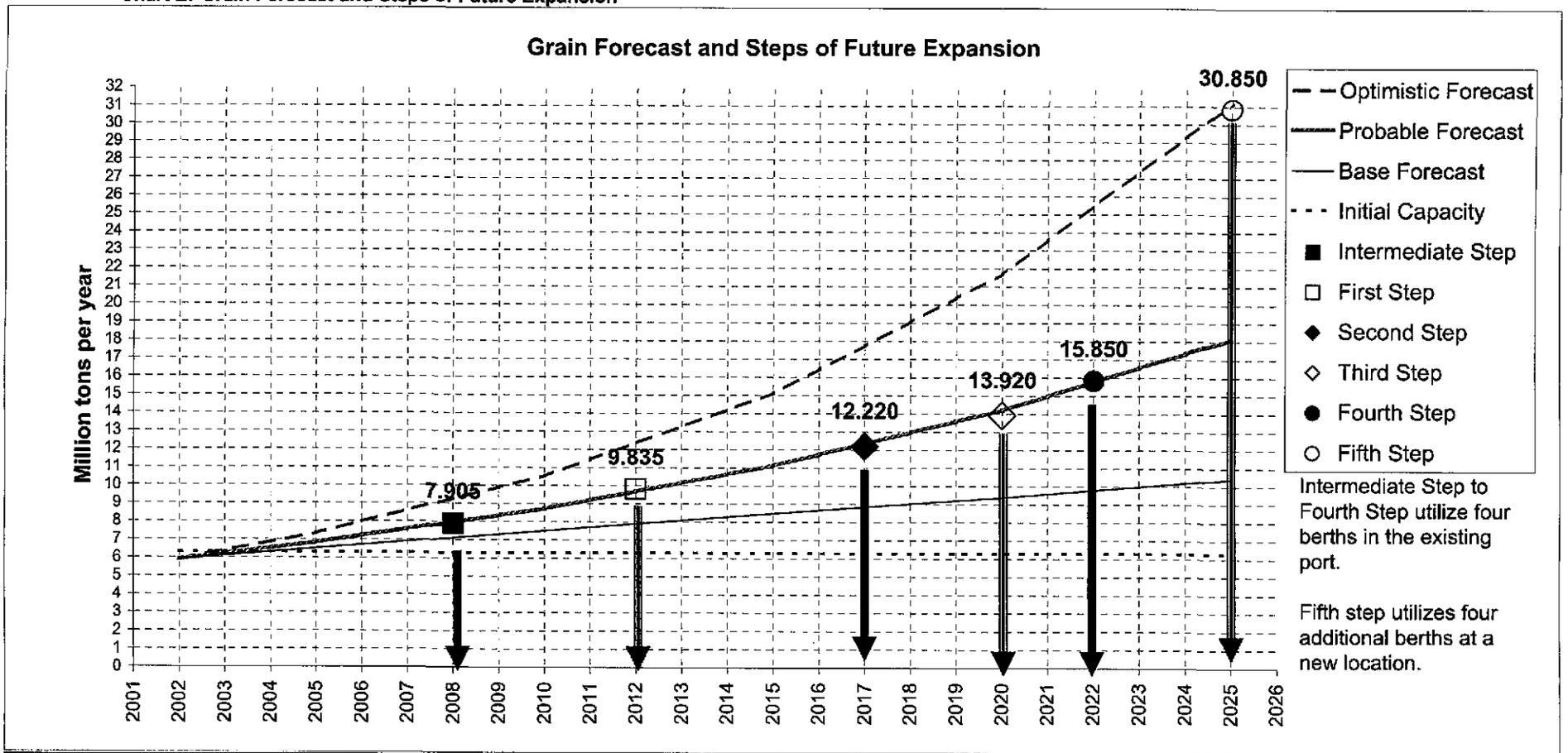
Chart E: Grain Forecast and Steps of Future Expansion



	2002	2005	2006	2007	2008	2009	2010	2011	**2012**	2013	2014	2015	2016	**2017**	2018	2019	**2020**	2021	**2022**	2023	2024	**2025**
Base Forecast	5.904	6.503	6.704	6.904	7.105	7.305	7.505	7.701	7.897	8.092	8.288	8.483	8.661	8.840	9.018	9.196	9.374	9.579	9.783	9.988	10.193	10.398
Probable Forecast	**5.904**	**6.834**	**7.212**	**7.589**	**7.967**	**8.345**	**8.722**	**9.204**	**9.686**	**10.168**	**10.650**	**11.132**	**11.747**	**12.362**	**12.978**	**13.593**	**14.208**	**14.993**	**15.778**	**16.563**	**17.348**	**18.133**
Optimistic Forecast	5.904	7.334	7.973	8.612	9.251	9.890	10.529	11.446	12.364	13.281	14.198	15.116	16.433	17.750	19.067	20.384	21.701	23.591	25.482	27.373	29.263	31.154
Initial Capacity	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300
Intermediate Step					**7.905**																	
First Step									**9.835**													
Second Step														**12.220**								
Third Step																	**13.920**					
Fourth Step																			**15.850**			
Fifth Step																						**30.850**

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USTDA - Veracruz Terminal Expansion Study
Summary of Grain Import Activities and Projections to the Future
Comparison Base Proposal versus TMV Berth

ALTERNATIVE B

DMJM HARRIS REPORT-Table 36B	Actual	Forecast				
YEAR	2002	2005	2010	2015	2020	2025
Base Forecast	5,903,641	6,503,121	7,505,444	8,483,357	9,373,791	10,397,705
Probable Forecast	**5,903,641**	**6,834,203**	**8,722,367**	**11,132,196**	**14,207,816**	**18,133,174**
Optimistic Forecast	5,903,641	7,334,075	10,529,013	15,115,760	21,700,628	31,154,058

GRAIN UNLOADING	FUTURE PROJECTIONS - BASE PROPOSAL						FUTURE PROJECTIONS - TMV BERTH ALTERNATIVE					
	Annual Throughput Average tons	Start Project & Con-struction *	Finish Project & Con-struction *	Suits Probable Forecast *Until*	Storage tons	Equipment Budget Cost Million US$	Annual Throughput Average tons	Start Project & Con-struction *	Finish Project & Con-struction *	Suits Probable Forecast *Until*	Storage tons	Equipment Budget Cost Million US$
Present Capability	6,200,000	-	-	-	146,000	-	6,200,000	-	-	-	146,000	-
INTERMEDIATE STEP	7,905,000	2005	2006	2008	156,000	$14.800	8,200,000	2005	2006	2009	208,000	$5.000 °
FIRST STEP	9,835,000	2006	2007	2012	200,000	$22.600	10,360,000	2007	2008	2013	228,000	$19.200
SECOND STEP	12,220,000	2011	2012	2017	245,000	$25.400	12,290,000	2012	2013	2017	272,000	$22.600
THIRD STEP	13,920,000	2014	2015	2020	280,000	$18.700	14,220,000	2016	2017	2020	307,000	$25.400
FOURTH STEP	15,850,000	2018	2019	2022	320,000	$21.900	17,850,000	2019	2020	2025	352,000	$40.600
STEP FIVE	23,350,000	-	-	-	470,000	$52.400	25,350,000	-	-	-	502,000	$52.400
					TOTAL:	**155.800**					**TOTAL:**	**165.200**

NOTES: * Assuming a two year project, procurement and construction time Schedule
+ Equipment budget cost does not include marine foundations, modifications to berths, etc.
Budget cost accuracy plus/minus 20% ° Budget indicated by TMV

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Table B-1c) Summary of Grain Handling Improvements, Throughput Capacity and Demand Forecasts

Base Proposal - Alternative B

From Section 3-Table 36B		Actual	Forecast					Conclusion
YEAR		2002	2005	2010	2015	2020	2025	
Base Forecast		5,903,641	6,503,121	7,505,444	8,483,357	9,373,791	10,397,705	Existing port developed to first step suits 2022
Probable Forecast		5,903,641	6,834,203	8,722,367	11,132,196	14,207,816	18,133,174	Existing port developed to fourth step suits 2022
Optimistic Forecast		5,903,641	7,334,075	10,529,013	15,115,760	21,700,628	31,154,058	Existing+NEW port developed to fifth step suits 2025

TERMINAL	FROM APIVER REPORT		Present Capability projected to 65% occupancy			Storage turns/year	Existing Storage Cap. Tons	Storage Throughput Limit tons
	2002 Occupancy	2002 Tonnage	t/y low at 65% occ.	t/y high at 65% occ.	EXISTING EQUIPMENT			
CARGILL 200m EJetty	72.1%	1,805,492	1,600,000	1,700,000	2x500t/h pneum.unloaders, RR/Tr.Loadout	52.1	50,000	2,600,000
TCE B#6S L~302m	84.5%	1,936,922	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Load-out			
TCE B#4S L~380m	66.1% + 80.7%	1,297,001	1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars			
TCE Other	(inner+outer)	880,233	1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars			
TCE Subtotal		4,114,156	4,500,000	4,600,000		52.1	96,000	5,000,000
GRAIN TOTAL		**5,919,648**	**6,100,000**	**6,300,000**		[7d. dwell time]	**146,000**	**7,600,000**

TERMINAL	FUTURE ADDITIONS INTERMEDIATE STEP	PROJECTIONS		EQUIPMENT REQUIREMENTS INTERMEDIATE STEP	Storage turns/year	Exist.+*New* Storage Cap.Tons	Storage Throughput Limit tons
		t/y Low	t/y High				
CARGILL 200m EJetty		1,600,000	1,700,000	2x500t/h pneum.unloaders, RR/Tr.Loadout	Existing	50,000	
	Add 500t/h unloader, RR-loadout	1,200,000	1,300,000	1 x 500t/h unloader, RR/Truck Loadout	New storage	*10,000*	
CARGILL Subtotal	Increase conveyor capacity	2,800,000	3,000,000	2 x 1,000 t/h conveyor systems	52.1	60,000	3,130,000
TCE B#6S L~302m	As existing at 65% occupancy	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout			
TCE B#5N L~270m	Mobile hoppers/conveyors	1,800,000	1,840,000	4x250t/h mobile hoppers, conveyor system	Existing	96,000	
TCE B#5S L~270m	As existing at #4S; 65% occupancy	1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars	New storage	*0*	
TCE Subtotal		4,950,000	5,060,000		52.1	96,000	5,010,000
GRAIN TOTAL	**AVERAGE: 7,905,000**	**7,750,000**	**8,060,000**		[7d. dwell time]	**156,000**	**8,140,000**

TERMINAL	FUTURE ADDITIONS FIRST STEP	PROJECTIONS		EQUIPMENT REQUIREMENTS FIRST STEP	Storage turns/year	Exist.+*New* Storage Cap.Tons	Storage Throughput Limit tons
		t/y Low	t/y High				
CARGILL 200m EJetty	No further additions	2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts			
CARGILL Subtotal		2,800,000	3,000,000	2 x 1,000 t/h conveyor systems	52.1	60,000	3,130,000
TCE B#6S L~302m	As existing at 65% occupancy	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout			
TCE B#5N L~270m	Add 3 unloaders, RR/Tr.Loadout	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	Existing	96,000	
TCE B#5S L~270m	As existing at #4S; 65% occupancy	1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars	New storage	*44,000*	
TCE Subtotal		6,750,000	7,120,000		52.1	140,000	7,300,000
GRAIN TOTAL	**AVERAGE: 9,835,000**	**9,550,000**	**10,120,000**		[7d. dwell time]	**200,000**	**10,430,000**

TERMINAL	FUTURE ADDITIONS SECOND STEP	PROJECTIONS		EQUIPMENT REQUIREMENTS SECOND STEP	Storage turns/year	Exist.+*New* Storage Cap.Tons	Storage Throughput Limit tons
		t/y Low	t/y High				
CARGILL 200m EJetty	No further additions	2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts			
CARGILL Subtotal		2,800,000	3,000,000	2 x 1,000 t/h conveyor systems	52.1	60,000	3,130,000
TCE B#6S L~302m	As existing at 65% occupancy	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout			
TCE B#5N L~270m	No further additions	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	140,000	
TCE B#5S L~270m	Add 3 unloaders, RR/Tr.Loadout	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	New storage	*45,000*	
TCE Subtotal		9,000,000	9,640,000		52.1	185,000	9,650,000
GRAIN TOTAL	**AVERAGE: 12,220,000**	**11,800,000**	**12,640,000**		[7d. dwell time]	**245,000**	**12,780,000**

TERMINAL	FUTURE ADDITIONS THIRD STEP	PROJECTIONS		EQUIPMENT REQUIREMENTS THIRD STEP	Storage turns/year	Exist.+*New* Storage Cap.Tons	Storage Throughput Limit tons
		t/y Low	t/y High				
CARGILL 200m EJetty	No further additions	2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts			
CARGILL Subtotal		2,800,000	3,000,000	2 x 1,000 t/h conveyor systems	52.1	60,000	3,130,000
TCE B#6S L~302m	As existing at 65% occupancy	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout			
TCE B#5N L~270m	No further additions	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	185,000	
TCE B#5S L~270m	Add 2 unloaders, RR/Tr.Loadout	5,250,000	5,650,000	(2+3)x600t/h unloaders, 2 RR/Truck Loadouts	New storage	*35,000*	
TCE Subtotal		10,650,000	11,390,000		52.1	220,000	11,470,000
GRAIN TOTAL	**AVERAGE: 13,920,000**	**13,450,000**	**14,390,000**		[7d. dwell time]	**280,000**	**14,600,000**

TERMINAL	FUTURE ADDITIONS FOURTH STEP	PROJECTIONS		EQUIPMENT REQUIREMENTS FOURTH STEP	Storage turns/year	Exist.+*New* Storage Cap.Tons	Storage Throughput Limit tons
		t/y Low	t/y High				
CARGILL 200m EJetty	No further additions	2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts			
CARGILL Subtotal		2,800,000	3,000,000	2 x 1,000 t/h conveyor systems	52.1	60,000	3,130,000
TCE B#6S L~302m	Add 3 unloaders, RR/Tr.Loadout	3,600,000	3,900,000	3x500t/h unloaders, 2 RR/Tuck Loadouts			
TCE B#5N L~270m	No further additions	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	220,000	
TCE B#5S L~270m	No further additions	5,250,000	5,650,000	5x600t/h unloaders, 2 RR/Truck Loadouts	New storage	*40,000*	
TCE Subtotal		12,450,000	13,450,000		52.1	260,000	13,560,000
GRAIN TOTAL	**AVERAGE: 15,850,000**	**15,250,000**	**16,450,000**		[7d. dwell time]	**320,000**	**16,690,000**

TERMINAL	FUTURE ADDITIONS STEP FIVE	PROJECTIONS		EQUIPMENT REQUIREMENTS STEP FIVE	Storage turns/year	Exist.+*New* Storage Cap.Tons	Storage Throughput Limit tons
		t/y Low	t/y High				
CARGILL 200m EJetty	No further additions	2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts	[7d. dwell time]		
CARGILL Subtotal		2,800,000	3,000,000	2 x 1,000 t/h conveyor systems	52.1	60,000	3,130,000
TCE B#6S L~302m	No further additions	3,600,000	3,900,000	3x500t/h unloaders, 2 RR/Tuck Loadouts	[7d. dwell time]		
TCE B#5N L~270m	No further additions	3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	260,000	
TCE B#5S L~270m	No further additions	5,250,000	5,650,000	5x600t/h unloaders, 2 RR/Truck Loadouts	No additions	-	
TCE Subtotal		12,450,000	13,450,000		52.1	260,000	13,560,000
New Location	Two berth faces: Arrangement of	3,600,000	3,900,000	3x500t/h unloaders, 1 RR/Tuck Loadout	52.1	*75,000*	3,910,000
New Jetty - L~300m	each jetty face similar to Berth #4N	3,600,000	3,900,000	3x500t/h unloaders, 1 RR/Tuck Loadout	52.1	*75,000*	3,910,000
GRAIN TOTAL	**AVERAGE: 23,350,000**	**22,450,000**	**24,250,000**		[7d. dwell time]	**470,000**	**24,510,000**

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Table B-1d) Summary of Grain Handling Improvements, Throughput Capacity and TMV - BERTH ALTERNATIVE

Project with TMV - Alternative B

From Section 3-Table 36B		Actual	Forecast					Conclusion
YEAR		2002	2005	2010	2015	2020	2025	
Base Forecast		5,903,641	6,503,121	7,505,444	8,483,357	9,373,791	10,397,705	Existing port developed to first step suits 2025
Probable Forecast		5,903,641	6,834,203	8,722,367	11,132,196	14,207,816	18,133,174	Existing port developed to fourth step suits 2025
Optimistic Forecast		5,903,641	7,334,075	10,529,013	15,115,760	21,700,628	31,154,058	Existing+NEW port developed to fifth step suits 2025
TERMINAL	**FROM APIVER REPORT**		**Present Capability projected to 65% occupancy**					
	2002 Occupancy	**2002 Tonnage**	**t/y low at 65% occ.**	**t/y high at 65% occ.**	**EXISTING EQUIPMENT**	**Storage turns/year**	**Existing Storage Cap. Tons**	**Storage Throughput Limit tons**
CARGILL 200m EJetty	72.1%	1,805,492	1,600,000	1,700,000	2x500t/h pneum.unloaders, RR/Tr.Loadout	52.1	50,000	2,600,000
TCE B#8S L~302m	84.5%	1,936,922	1,800,000	1,840,000	Self-unloading ships, 2 conv's to Load-out			
TCE B#4S L~380m	66.1% + 80.7%	1,297,001	1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars			
TCE Other	(inner+outer)	880,233	1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars			
TCE Subtotal		4,114,156	4,500,000	4,600,000		52.1	96,000	5,000,000
GRAIN TOTAL		**5,919,648**	**6,100,000**	**6,300,000**		[7d. dwell time]	**146,000**	**7,600,000**
TERMINAL	**FUTURE ADDITIONS INTERMEDIATE STEP**		**PROJECTIONS**		**EQUIPMENT REQUIREMENTS INTERMEDIATE STEP**	**Storage turns/year**	**Exist.+New Storage Cap.Tons**	**Storage Throughput Limit tons**
			t/y Low	**t/y High**				
CARGILL 200m EJetty	As existing at 65% occupancy		1,600,000	1,700,000	2x500t/h pneum.unloaders, RR/Tr.Loadout	52.1	50,000	2,600,000
TMV Berth	Traveling conv's for SUShips				Traveling receiving conveyors for SUShips	32.3	*New storage*	
	1,000t/h conv.system,RR&Tr.L.O.		2,000,000	2,000,000	1,000t/h conv.system, RR&Truck Loadouts	[11d.dwell time]	*62,000*	2,000,000
TCE B#6S L~302m	As existing at 65% occupancy		1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout			
TCE B#5N L~270m	As existing at #4N; 65% occupancy		1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars	Existing	96,000	
TCE B#5S L~270m	As existing at #4S; 65% occupancy		1,350,000	1,380,000	Self-unloading ships loading trucks/rail-cars	No additions	-	
TCE Subtotal			4,500,000	4,600,000		52.1	96,000	5,000,000
GRAIN TOTAL	**AVERAGE: 6,200,000**		**6,100,000**	**6,300,000**		*[7d. dwell time]*	***208,000***	***9,600,000***
TERMINAL	**FUTURE ADDITIONS FIRST STEP**		**PROJECTIONS**		**EQUIPMENT REQUIREMENTS FIRST STEP**	**Storage turns/year**	**Exist.+New Storage Cap.Tons**	**Storage Throughput Limit tons**
			t/y Low	**t/y High**				
CARGILL 200m EJetty			1,600,000	1,700,000	2x500t/h pneum.unloaders, RR/Tr.Loadout	Existing	50,000	
	Add 500t/h unloader, RR-loadout		1,200,000	1,300,000	1 x 500t/h unloader, RR/Truck Loadout	New storage	*10,000*	
CARGILL Subtotal	Increase conveyor capacity		2,800,000	3,000,000	2 x 1,000 t/h conveyor systems	52.1	60,000	3,100,000
TMV Berth	No further additions		2,000,000	2,000,000	1000t/h conv.system, RR&Truck Loadouts	32.3	62,000	2,000,000
TCE B#6S L~302m	As existing at 65% occupancy		1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout	[11d.dwell time]	33.0	
TCE B#5N L~270m	Mobile hoppers/conveyors		1,800,000	1,840,000	4x250t/h mobile hoppers, conveyor system	Existing	96,000	
TCE B#5S L~270m	Mobile hoppers/conveyors		1,800,000	1,840,000	4x250t/h mobile hoppers, conveyor system	New storage	*10,000*	
TCE Subtotal			7,200,000	7,520,000		52.1	106,000	5,500,000
GRAIN TOTAL	**AVERAGE: 10,360,000**		**10,200,000**	**10,520,000**		[7d. dwell time]	**228,000**	**10,600,000**
TERMINAL	**FUTURE ADDITIONS *SECOND STEP***		**PROJECTIONS**		**EQUIPMENT REQUIREMENTS *SECOND STEP***	**Storage turns/year**	**Exist.+New Storage Cap.Tons**	**Storage Throughput Limit tons**
			t/y Low	**t/y High**				
CARGILL 200m EJetty	No further additions		2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts	52.1	60,000	3,100,000
TMV Berth	No further additions		2,000,000	2,000,000	1000t/h conv.system, RR&Truck Loadouts	32.3	62,000	2,000,000
TCE B#6S L~302m	As existing at 65% occupancy		1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout	[11d.dwell time]		
TCE B#5N L~270m	Add 3 unloaders, RR/Tr.Loadout		3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	106,000	
TCE B#5S L~270m	No further additions		1,800,000	1,840,000	4x250t/h mobile hoppers, conveyor system	New storage	*44,000*	
TCE Subtotal			7,200,000	7,580,000		52.1	150,000	7,800,000
GRAIN TOTAL	**AVERAGE: 12,290,000**		**12,000,000**	**12,580,000**		[7d. dwell time]	**272,000**	**12,900,000**
TERMINAL	**FUTURE ADDITIONS THIRD STEP**		**PROJECTIONS**		**EQUIPMENT REQUIREMENTS THIRD STEP**	**Storage turns/year**	**Exist.+New Storage Cap.Tons**	**Storage Throughput Limit tons**
			t/y Low	**t/y High**				
CARGILL 200m EJetty	No further additions		2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts	52.1	60,000	3,100,000
TMV Berth	No further additions		2,000,000	2,000,000	1000t/h conv.system, RR&Truck Loadouts	32.3	62,000	2,000,000
TCE B#6S L~302m	As existing at 65% occupancy		1,800,000	1,840,000	Self-unloading ships, 2 conv's to Loadout	[11d.dwell time]		
TCE B#5N L~270m	*No further additions*		3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	150,000	
TCE B#5S L~270m	Add 3 unloaders, RR/Tr.Loadout		3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	New storage	*35,000*	
TCE Subtotal			9,000,000	9,640,000		52.1	185,000	9,600,000
GRAIN TOTAL	**AVERAGE: 14,220,000**		**13,800,000**	**14,640,000**		[7d. dwell time]	**307,000**	**14,700,000**
TERMINAL	**FUTURE ADDITIONS FOURTH STEP**		**PROJECTIONS**		**EQUIPMENT REQUIREMENTS FOURTH STEP**	**Storage turns/year**	**Exist.+New Storage Cap.Tons**	**Storage Throughput Limit tons**
			t/y Low	**t/y High**				
CARGILL 200m EJetty	No further additions		2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts	52.1	60,000	3,100,000
TMV Berth	No further additions		2,000,000	2,000,000	1000t/h conv.system, RR&Truck Loadouts	32.3	62,000	2,000,000
TCE B#6S L~302m	Add 3 unloaders, RR/Tr.Loadout		3,600,000	3,900,000	3x500t/h unloaders, 2 RR/Tuck Loadouts	[11d.dwell time]		
TCE B#5N L~270m	No further additions		3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	185,000	
TCE B#5S L~270m	Add 2 unloaders, RR/Tr.Loadout		5,250,000	5,650,000	(2+3)x600t/h unloaders, 2 RR/Truck Loadouts	New storage	*45,000*	
TCE Subtotal			12,450,000	13,450,000		52.1	230,000	12,000,000
GRAIN TOTAL	**AVERAGE: 17,850,000**		**17,250,000**	**18,450,000**		[7d. dwell time]	**352,000**	**17,100,000**
TERMINAL	**FUTURE ADDITIONS STEP FIVE**		**PROJECTIONS**		**EQUIPMENT REQUIREMENTS STEP FIVE**	**Storage turns/year**	**Exist.+New *Storage* Cap.Tons**	**Storage *Throughput* Limit tons**
			t/y Low	**t/y High**				
CARGILL 200m EJetty	No further additions		2,800,000	3,000,000	3 x 500t/h unloaders, 2 RR/Tr.Loadouts	52.1	60,000	3,100,000
TMV Berth	No further additions		2,000,000	2,000,000	1000t/h conv.system, RR&Truck Loadouts	32.3	62,000	2,000,000
TCE B#6S L~302m	No further additions		3,600,000	3,900,000	3x500t/h unloaders, 2 RR/Tuck Loadouts	[11d.dwell time]		
TCE B#5N L~270m	No further additions		3,600,000	3,900,000	3x600t/h unloaders, 1 RR/Tuck Loadout	From prev.step	230,000	
TCE B#5S L~270m	No further additions		5,250,000	5,650,000	5x600t/h unloaders, 2 RR/Truck Loadouts	No additions	-	
TCE Subtotal			12,450,000	13,450,000		52.1	230,000	12,000,000
New Location	Two berth faces: Arrangement of		3,600,000	3,900,000	3x500t/h unloaders, 1 RR/Tuck Loadout	52.1	*75,000*	3,910,000
New Jetty - L~300m	each jetty face similar to Berth #4N		3,600,000	3,900,000	3x500t/h unloaders, 1 RR/Tuck Loadout	52.1	*75,000*	3,910,000
GRAIN TOTAL	**AVERAGE: 25,350,000**		**24,450,000**	**26,250,000**		[7d. dwell time]	**502,000**	**24,920,000**

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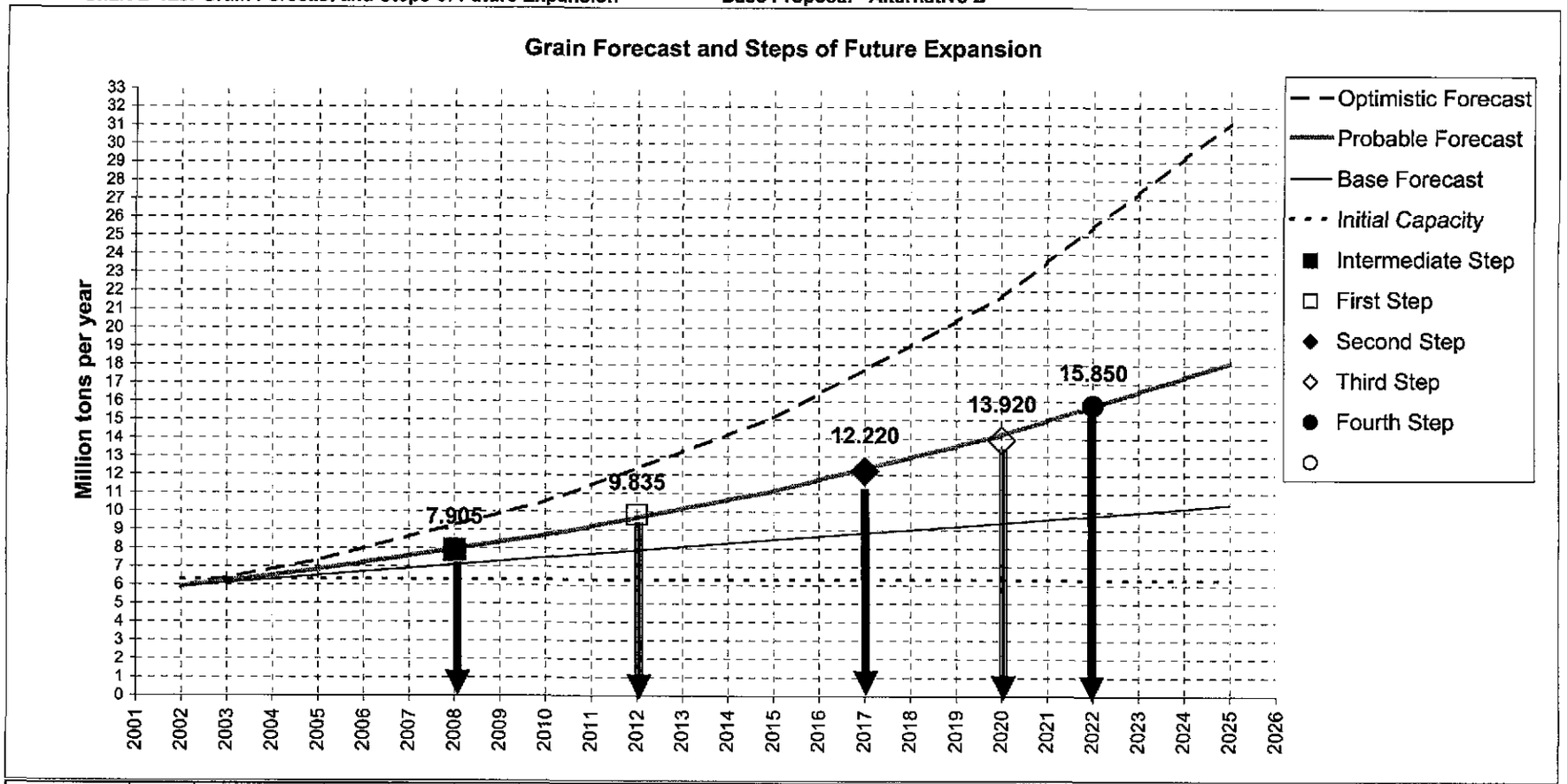
June 17, 2005
by: K.Kroeter

USTDA APIVER Feasibility Study for the Veracruz Port Expansion Project

Chart B-12c: Grain Forecast and Steps of Future Expansion **Base Proposal - Alternative B**



	2002	2005	2006	2007	**2008**	2009	2010	2011	**2012**	2013	2014	2015	2016	**2017**	2018	2019	**2020**	2021	**2022**	2023	2024	**2025**
Base Forecast	5.904	6.503	6.704	6.904	7.105	7.305	7.505	7.701	7.897	8.092	8.288	8.483	8.661	8.840	9.018	9.196	9.374	9.579	9.783	9.988	10.193	10.398
Probable Forecast	**5.904**	**6.834**	**7.212**	**7.589**	**7.967**	**8.345**	**8.722**	**9.204**	**9.686**	**10.168**	**10.650**	**11.132**	**11.747**	**12.362**	**12.978**	**13.593**	**14.208**	**14.993**	**15.778**	**16.563**	**17.348**	**18.133**
Optimistic Forecast	5.904	7.334	7.973	8.612	9.251	9.890	10.529	11.446	12.364	13.281	14.198	15.116	16.433	17.750	19.067	20.384	21.701	23.591	25.482	27.373	29.263	31.154
Initial Capacity	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300
Intermediate Step					**7.905**																	
First Step									**9.835**													
Second Step														**12.220**								
Third Step																	**13.920**					
Fourth Step																			**15.850**			

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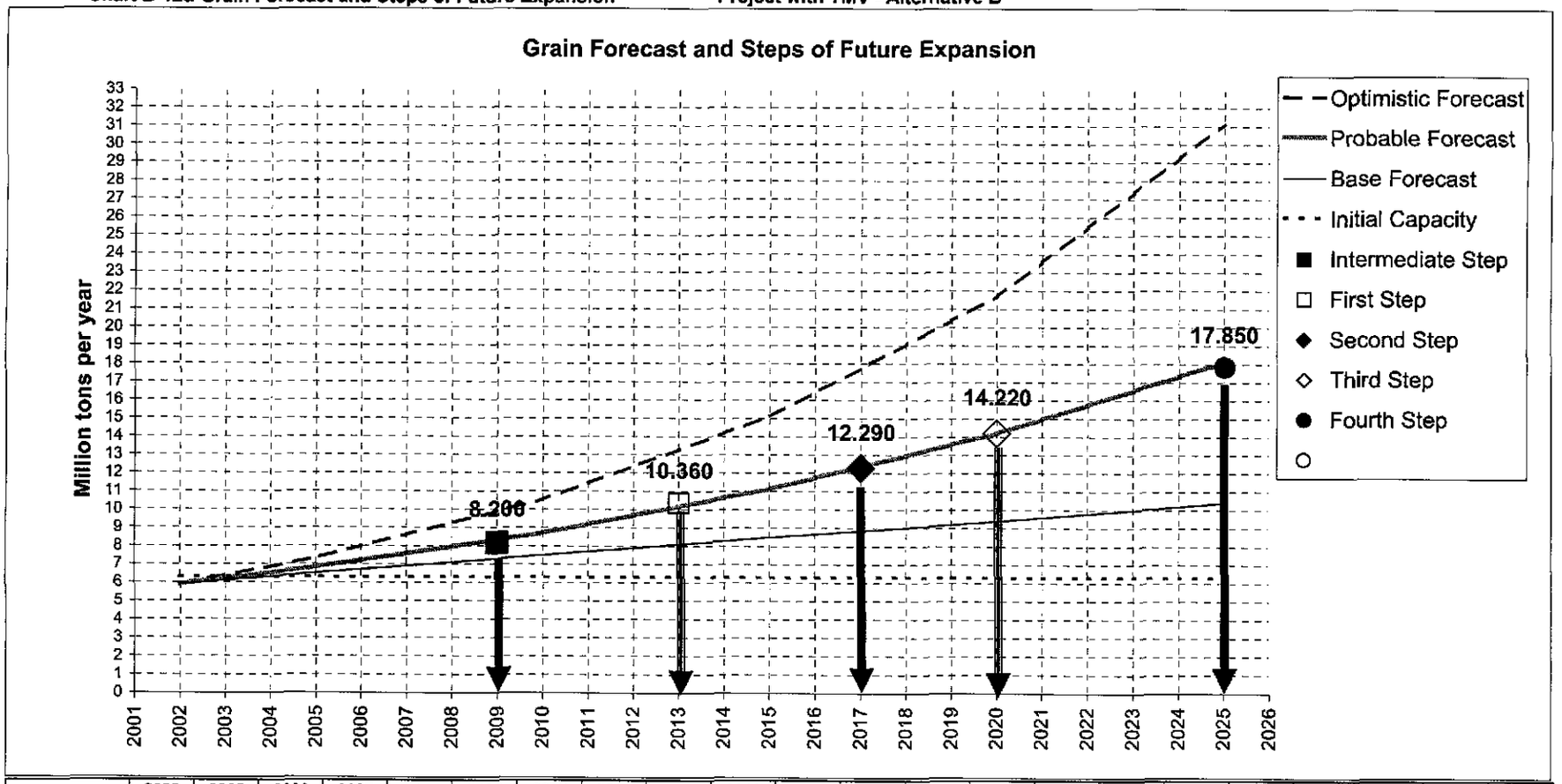
PORT DEVELOPMENT • CARGO HANDLING SYSTEMS • OFFSHORE TERMINALS

June 17, 2005
by: K.Kroeter

USTDA APIVER Feasibility Study for the Veracruz Port Expansion Project

Chart B-12d Grain Forecast and Steps of Future Expansion **Project with TMV - Alternative B**



	2002	2005	2006	2007	2008	**2009**	2010	2011	2012	**2013**	2014	2015	2016	**2017**	2018	2019	**2020**	2021	2022	2023	2024	**2025**
Base Forecast	5.904	6.503	6.704	6.904	7.105	7.305	7.505	7.701	7.897	8.092	8.288	8.483	8.661	8.840	9.018	9.196	9.374	9.579	9.783	9.988	10.193	10.398
Probable Forecast	**5.904**	**6.834**	**7.212**	**7.589**	**7.967**	**8.345**	**8.722**	**9.204**	**9.686**	**10.168**	**10.650**	**11.132**	**11.747**	**12.362**	**12.978**	**13.593**	**14.208**	**14.993**	**15.778**	**16.563**	**17.348**	**18.133**
Optimistic Forecast	5.904	7.334	7.973	8.612	9.251	9.890	10.529	11.446	12.364	13.281	14.198	15.116	16.433	17.750	19.067	20.384	21.701	23.591	25.482	27.373	29.263	31.154
Initial Capacity	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300	6.300
Intermediate Step						**8.200**																
First Step										**10.360**												
Second Step														**12.290**								
Third Step																	**14.220**					
Fourth Step																						**17.850**

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BUDGET SUMMARY of Mineral Import Activities

Budget Accuracy ±20%

TERMINAL AND BERTH OPERATION	Unloading Equipment	Storage x 1000 tons	Annual throughput mill.tons		Handling Equipment Budget Cost	Added throughput mill.tons		Cost per million ton added throughput
			LOW	HIGH		LOW	HIGH	
BERTH No. 4N EXISTING OPERATION	Truck Hoppers	35	0.70	0.77	-	-	-	-
BERTH No. 4S EXISTING OPERATION	Truck Hoppers		0.70	0.77	-	-	-	-
OTHER BERTH EXISTING OPERATION	Truck Hoppers		0.35	0.38	-	-	-	-
EXISTING TERMINAL TOTAL AT 65% OCCUPANCY		**35**	**1.75**	**1.92**	-	-	-	-
BERTH No. 4N EXISTING OPERATION	Truck Hoppers	35	0.70	0.77	-	-	-	-
INTERMEDIATE UPGRADING of BERTH No.4S	4 Mobile Hoppers	15	1.70	1.78	$9,200,000	1.00	1.01	$9,200,000
FIRST STEP TOTAL		**50**	**2.40**	**2.55**	**$9,200,000**	**0.65**	**0.63**	**$14,400,000**
FIRST STEP ADDITION		***15***	***0.65***	***0.63***	***$9,200,000***			***$14,400,000***
INTERMEDIATE UPGRADING of BERTH No. 4N	4 Mobile Hoppers	20	1.70	1.78	$9,200,000	1.70	1.78	$5,300,000
INTERMEDIATE UPGRADING of BERTH No.4S	4 Mobile Hoppers	50	1.70	1.78	$9,200,000	1.70	1.78	$5,300,000
SECOND STEP TOTAL		**70**	**3.40**	**3.56**	**$18,400,000**	**1.65**	**1.64**	**$11,200,000**
SECOND STEP ADDITION		***20***	***1.00***	***1.01***	***$9,200,000***			***$9,200,000***
FINAL UPGRADING of BERTH No.4N	3x500t/h Mech.Unl.	40	3.80	4.00	$24,000,000	3.80	4.00	$6,200,000
INTERMEDIATE UPGRADING of BERTH No.4S	4 Mobile Hoppers	70	1.70	1.78	$9,200,000	1.70	1.78	$5,300,000
THIRD STEP TOTAL		**110**	**5.50**	**5.78**	**$33,200,000**	**3.75**	**3.86**	**$8,700,000**
THIRD STEP ADDITION		***40***	***2.10***	***2.22***	***$14,800,000***			***$6,900,000***
FINAL UPGRADING of BERTH No.4N	3x500t/h Mech.Unl.	110	3.80	4.00	$24,000,000	3.80	4.00	$6,200,000
FINAL UPGRADING of BERTH No. 4S	2x500t/h Mech.Unl.	20	2.70	2.80	$19,600,000	2.70	2.80	$7,100,000
NEW BERTH AT NEW LOCATION	2x500t/h Mech.Unl.	55	2.70	2.80	$19,600,000	2.00	2.03	$9,700,000
FOURTH STEP TOTAL		**185**	**9.20**	**9.60**	**$63,200,000**	**7.45**	**7.68**	**$8,400,000**
FOURTH STEP ADDITION		***75***	***3.70***	***3.82***	***$30,000,000***			***$8,000,000***

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Table No. B-S1 BUDGET COST ESTIMATE SUMMARY

INTERMEDIATE UPGRADING of BERTH No.4S — **4 mobile hoppers+conveyors+15,000t storage**

ITEM LIST	No	Conv. Width m	Conv. Length m	Conv. Capacity m.tph	Inst. kW	Inst.Wt. tons	Budget Cost US $	REMARKS Accuracy±20%
Belt Conveyor at Berth	C1	1.4	300	1,000	75	190	$870,000	
Belt Conveyor to open Storage	C2	1.4	200	1,000	75	150	$700,000	
Belt Conveyor to covered Storage	C3	1.4	200	1,000	75	150	$700,000	
Reclaim Conveyor	C4	1.4	200	1,000	75	150	$700,000	
Belt Conveyor to Load-outs	C5	1.4	200	1,000	75	150	$700,000	
Mobile Hopper/Feeder for SU Ships	4			4 x 250	100	120	$1,200,000	
Transfer Station C1/C2	TS1				8	40	$100,000	
Transfer Station C2/C3	TS2				8	40	$100,000	
Covered storage w.aeration	1	30 x 100 m		12,000t	200	250	$600,000	Balance 3,000t open storage
Truck loading system	TLS			500	30	30	$120,000	
Railcar loading system	RLS			1,000	50	40	$160,000	
Truck Scales in/out	2				2	20	$80,000	
						Totl.tons		
				Misc.Utilities	42	772	$6,030,000	
Electric Equipment, MCC's, power distribution, controls, lighting, grounding					810 kW total		$970,000	
(1) Wheel Loader for vessel clean out							$0	Existing
Mobile Maintenance Equipment							$0	Existing
			SUBTOTAL 1				$7,000,000	
Spare Parts percentage of SUBTOTAL 1:						5.0%	$350,000	
Civils: Conveyor and Transfers Foundations							$480,000	
Civil Work on Land for Storage						rounded	$160,000	
CIVILS: Marine works - Rails for mobile hoppers							$0	by others
			SUBTOTAL 2				$7,990,000	
Engineering percentage of SUBTOTAL 2:						5.0%	$400,000	
			SUBTOTAL 3				$8,390,000	
Contingencies percentage of SUBTOTAL 3:						10.0%	$840,000	
			GRAND TOTAL			rounded	$9,200,000	

Civil Cost				Unit Cost			Item Cost	Remarks
Site Preparation 50 x 100 m		6,000	m²	$10			$60,000	
Soil Cement for storage		4,000	m²	$25			$100,000	
				Total Civil Cost:			$160,000	entered above

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Table No. B-S2 BUDGET COST ESTIMATE SUMMARY

INTERMEDIATE UPGRADING of BERTH No. 4N — **4 mobile hoppers+conveyors+20,000t storage**

ITEM LIST	No	Conv. Width m	Conv. Length m	Conv. Capacity m.tph	Inst. kW	Inst.Wt. tons	Budget Cost US $	REMARKS Accuracy±20%
Belt Conveyor at Berth	C1	1.4	300	1,000	75	190	$870,000	
Belt Conveyor to open Storage	C2	1.4	200	1,000	75	150	$700,000	
Belt Conveyor to covered Storage	C3	1.4	200	1,000	75	150	$700,000	
Reclaim Conveyor	C4	1.4	200	1,000	75	150	$700,000	
Belt Conveyor to Load-outs	C5	1.4	200	1,000	75	150	$700,000	
Mobile Hopper/Feeder for SU Ships	4			4 x 250	100	120	$1,200,000	
Transfer Station C1/C2	TS1				8	40	$100,000	
Transfer Station C2/C3	TS2				8	40	$100,000	
Covered storage w.aeration	1	30 x 100 m		12,000t	200	250	$600,000	Balance 8,000t open storage
Truck loading system	TLS			500	30	30	$120,000	
Railcar loading system	RLS			1,000	50	40	$160,000	
Truck Scales in/out	2				2	20	$80,000	
						Totl.tons		
				Misc.Utilities	42	772	$6,030,000	
Electric Equipment, MCC's, power distribution, controls, lighting, grounding					810 kW total		$970,000	
(1) Wheel Loader for vessel clean out							$0	Existing
Mobile Maintenance Equipment							$0	Existing
			SUBTOTAL 1				$7,000,000	
Spare Parts percentage of SUBTOTAL 1:						5.0%	$350,000	
Civils: Conveyor and Transfers Foundations							$480,000	
Civil Work on Land for Storage						rounded	$160,000	
CIVILS: Marine works - Rails for mobile hoppers							$0	by others
			SUBTOTAL 2				$7,990,000	
Engineering percentage of SUBTOTAL 2:						5.0%	$400,000	
			SUBTOTAL 3				$8,390,000	
Contingencies percentage of SUBTOTAL 3:						10.0%	$840,000	
			GRAND TOTAL			rounded	$9,200,000	

Civil Cost				Unit Cost			Item Cost	Remarks
Site Preparation 50 x 120 m		6,000	m²	$10			$60,000	
Soil Cement for storage		4,000	m²	$25			$100,000	
				Total Civil Cost:			$160,000	entered above

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Table No. B-S3 BUDGET COST ESTIMATE SUMMARY

FINAL UPGRADING of BERTH No.4N 3x500 t/h unloaders+40,000t storage

ITEM LIST	No	Conv. Width m	Conv. Length m	Conv. Capacity m.tph	Inst. kW	Inst.Wt. tons	Budget Cost US $	REMARKS Accuracy±20%
Belt Conveyor at Berth	C1	1.4	300	2,000	150	200	$890,000	From Table B-S2, second drive added to each conveyor
Belt Conveyor to open Storage	C2	1.4	200	2,000	150	160	$730,000	
Belt Conveyor to covered Storage	C3	1.4	200	2,000	150	160	$730,000	
Reclaim Conveyor	C4	1.4	200	2,000	150	160	$730,000	
Belt Conveyor to Load-outs	C5	1.4	200	2,000	150	160	$730,000	
Mobile Hopper/Feeder for SU Ships	4			1,000	100	120	$1,200,000	From BS-2
Grab Unloaders	3			3 x 600	1,200	1,200	$9,900,000	
Transfer Station C1/C2	TS1				8	40	$100,000	From BS-2
Transfer Station C2/C3	TS2				8	40	$100,000	From BS-2
Covered storage w.aeration	1	30 x 100 m		12,000t	200	250	$600,000	BS-2: 8,000t open
Covered storage w.aeration	1	30 x 100 m		12,000t	200	250	$600,000	Balance 28,000t open
Truck loading system	TLS			2x500	60	60	$240,000	BS-2 doubled
Railcar loading system	RLS			2x1,000	100	80	$320,000	BS-2 doubled
Truck Scales in/out	2				2	20	$80,000	
						Totl.tons		
				Misc.Utilities	131	2,900	$16,950,000	
Electric Equipment, MCC's, power distribution, controls, lighting, grounding					2,760	kW total	$2,000,000	
(1) Wheel Loader for vessel clean out							$0	Existing
Mobile Maintenance Equipment							$0	Existing
			SUBTOTAL 1				$18,950,000	
Spare Parts percentage of SUBTOTAL 1:						5.0%	$950,000	
Civils: Conveyor and Transfers Foundations							$590,000	
Civil Work on Land for Silos						rounded	$320,000	see details below
CIVILS: Marine works -							$0	by others
			SUBTOTAL 2				$20,810,000	
Engineering percentage of SUBTOTAL 2:						5.0%	$1,040,000	
			SUBTOTAL 3				$21,850,000	
Contingencies percentage of SUBTOTAL 3:						10.0%	$2,190,000	
			GRAND TOTAL			rounded	$24,000,000	

Civil Cost				Unit Cost			Item Cost	Remarks
Site Preparation 50 x 240 m		12,000	m²	$10			$120,000	
Soil Cement for storage		8,000	m²	$25			$200,000	
				Total Civil Cost:			$320,000	entered above

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Table No. B-S4 BUDGET COST ESTIMATE SUMMARY

FINAL UPGRADING of BERTH No. 4S 2x500 t/h unloaders+20,000t storage

ITEM LIST	No	Conv. Width m	Conv. Length m	Conv. Capacity m.tph	Inst. kW	Inst.Wt. tons	Budget Cost US $	REMARKS Accuracy±20%
Belt Conveyor at Berth	C1	1.4	300	1,400	150	200	$890,000	From Table B-S1, second drive added to each conveyor
Belt Conveyor to open Storage	C2	1.4	200	1,400	150	160	$730,000	
Belt Conveyor to covered Storage	C3	1.4	200	1,400	150	160	$730,000	
Reclaim Conveyor	C4	1.4	200	1,400	150	160	$730,000	
Belt Conveyor to Load-outs	C5	1.4	200	1,400	150	160	$730,000	
Mobile Hopper/Feeder for SU Ships	4			1,000	100	120	$1,200,000	From BS-1
Grab Unloaders	2			2 x 600	800	800	$6,600,000	
Transfer Station C1/C2	TS1				8	40	$100,000	From BS-1
Transfer Station C2/C3	TS2				8	40	$100,000	From BS-1
Covered storage w.aeration	1	30 x 100 m		12,000t	200	250	$600,000	BS-1: 3,000t open
Covered storage w.aeration	1	30 x 100 m		12,000t	200	250	$600,000	Balance 8,000t open
Truck loading system	TLS			2x500	60	60	$240,000	BS-1 doubled
Railcar loading system	RLS			2x1,000	100	80	$320,000	BS-1 doubled
Truck Scales in/out	2				2	20	$80,000	
						Totl.tons		
				Misc.Utilities	111	2,500	$13,650,000	
Electric Equipment, MCC's, power distribution, controls, lighting, grounding					2,340	kW total	$1,670,000	
(1) Wheel Loader for vessel clean out							$0	Existing
Mobile Maintenance Equipment							$0	Existing
			SUBTOTAL 1				$15,320,000	
Spare Parts percentage of SUBTOTAL 1:						5.0%	$770,000	
Civils: Conveyor and Transfers Foundations							$590,000	
Civil Work on Land for Storage						rounded	$320,000	see details below
CIVILS: Marine works -							$0	by others
			SUBTOTAL 2				$17,000,000	
Engineering percentage of SUBTOTAL 2:						5.0%	$850,000	
			SUBTOTAL 3				$17,850,000	
Contingencies percentage of SUBTOTAL 3:						10.0%	$1,790,000	
			GRAND TOTAL			rounded	$19,600,000	

Civil Cost				Unit Cost			Item Cost	Remarks
Site Preparation 50 x 120 m		12,000	m²	$10			$120,000	
Soil Cement for storage		8,000	m²	$25			$200,000	
				Total Civil Cost:			$320,000	entered above

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Table No. B-S5 BUDGET COST ESTIMATE SUMMARY

NEW BERTH AT NEW LOCATION 2x500 t/h unloaders+55,000t storage

ITEM LIST	No	Conv. Width m	Conv. Length m	Conv. Capacity m.tph	Inst. kW	Inst.Wt. tons	Budget Cost US $	REMARKS Accuracy±20%
Belt Conveyor at Berth	C1	1.4	300	1,400	150	200	$890,000	
Belt Conveyor to open Storage	C2	1.4	200	1,400	150	160	$730,000	
Belt Conveyor to covered Storage	C3	1.4	200	1,400	150	160	$730,000	
Reclaim Conveyor	C4	1.4	200	1,400	150	160	$730,000	
Belt Conveyor to Load-outs	C5	1.4	200	1,400	150	160	$730,000	
Grab Unloaders	2			2 x 600	800	800	$6,600,000	
Transfer Station C1/C2	TS1				8	40	$100,000	
Transfer Station C2/C3	TS2				8	40	$100,000	
Covered storage w.aeration	3	30 x 100 m		3x12,000t	600	750	$1,800,000	Balance 19,000t open strg.
Truck loading system	TLS		18	2x500	60	60	$240,000	
Railcar loading system	RLS			2x1,000	100	80	$320,000	
Truck Scales in/out	2				2	20	$80,000	
						Totl.tons		
				Misc.Utilities	116	2,630	$13,050,000	
Electric Equipment, MCC's, power distribution, controls, lighting, grounding					2,440	kW total	$1,610,000	
(1) Wheel Loader for vessel clean out							$300,000	CAT 950E or equal
Mobile Maintenance Equipment							$100,000	
			SUBTOTAL 1				$15,060,000	
Spare Parts percentage of SUBTOTAL 1:						5.0%	$750,000	
Civils: Conveyor and Transfers Foundations							$650,000	
Civil Work on Land for Silos						rounded	$480,000	see details below
CIVILS: Marine works -							$0	by others
			SUBTOTAL 2				$16,940,000	
Engineering percentage of SUBTOTAL 2:						5.0%	$850,000	
			SUBTOTAL 3				$17,790,000	
Contingencies percentage of SUBTOTAL 3:						10.0%	$1,780,000	
			GRAND TOTAL			rounded	$19,600,000	

Civil Cost				Unit Cost			Item Cost	Remarks
Site Preparation 50 x 120 m		18,000	m²	$10			$180,000	
Soil Cement for storage		12,000	m²	$25			$300,000	
				Total Civil Cost:			$480,000	entered above

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LIST OF US MANUFACTURERS , CAPABLE TO SUPPLY HANDLING SYSTEMS

MANUFACTURERS	LOCATION	CONTACT	TELEPHONE	TELEFAX	COMPLETE HANDLING SYSTEMS	MECHANICAL UNLOADERS [CONTINUOUS or CLAMSHELL]	BELT- & CHAIN-CONVEYORS BUCKET ELEVATORS	STORAGE SYSTEMS
	USA							
FLSMIDTH [Fuller Bulk Handling]	Bethlehem, PA 18016	Michael Gregory michael.gregory@flsmidth.com	610 264 6924	610 264 6735	**YES**	**YES**	**YES**	**YES**
Heyl & Patterson	Pittsburgh, PA 15230	Jerry Spehar info@HeylPatterson.com	724 743 1000	724 743 2850		**YES**		**YES**
Kocks Crane, Inc.	Pittsburgh, PA 15237	Richard W Theobald rwt@kockscrane.com	412 367 4530	412 367 4519		**YES**		**YES**
ThyssenKrupp Robins	Englewood, CO 80111	kri@krupprobins.com	303 770 0808	303 770 4522	**YES**	**YES**	**YES**	**YES**
MAN TAKRAF, Inc.	Denver, CO 80111	Gerhard Hertel takraf@takraf.com	303 770 8161	303 770 6307	**YES**	**YES**	**YES**	**YES**
METSO Minerals Materials Handling	Canonsburg, PA 15317	Thimothy Sexton tim.sexton@metso.com	412 269 5000	412 269 5050	**YES**	**YES**	**YES**	**YES**
Roberts & Schaefer Company	Chicago, IL 60606	Robert Williams bobw@eni.com	312 236 7292	312 726 2872	**YES**	**SUB**	**YES**	**YES**

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USTDA - Veracruz Terminal Expansion Study

Summary of Mineral Products Import Activities and Projections to the Future

DMJM HARRIS REPORT-Table 36B	Actual	Forecast				
YEAR	2002	2005	2010	2015	2020	2025
Base Forecast	1,743,739	1,788,702	2,013,763	2,260,455	2,504,855	2,802,866
Probable Forecast	**1,743,739**	**2,018,596**	**2,576,297**	**3,288,080**	**4,196,517**	**5,355,937**
Optimistic Forecast	1,743,739	2,166,242	3,109,920	4,464,693	6,409,644	9,201,873

GRAIN UNLOADING	FUTURE PROJECTIONS - AVERAGE					
	Annual Throughput Average tons	Start Project & Construction *	Finish Project & Construction *	Suits Probable Forecast Until	Storage tons	Equipment Budget Cost Million US$
Present Capability	**1,835,000**	-	-	-	**35,000**	-
FIRST STEP	**2,475,000**	**2005**	**2006**	**2009**	**50,000**	**$9.200**
SECOND STEP	**3,480,000**	**2008**	**2009**	**2016**	**70,000**	**$9.200**
THIRD STEP	**5,640,000**	**2015**	**2016**	**2025**	**110,000**	**$14.800**
FOURTH STEP	**9,400,000**	**Suits Optimistic Forecast**			**185,000**	**$30.000**
					TOTAL:	**$63.200**

NOTES: * Assuming a two year project, procurement and construction time Schedule
+ Equipment budget cost does not include marine foundations, modifications to berths, etc.
Budget cost accuracy plus/minus 20%

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Table C-1 Summary of Mineral Handling Improvements, Throughput Capacity and Demand Forecasts

DMJM HARRIS REPORT Table 36B	Actual	Forecast					Conclusion
YEAR	2002	2005	2010	2015	2020	2025	Two dedicated berth faces assumed initially at existing location, third dedicated berth face at new location
Base Forecast	1,743,739	1,788,702	2,013,763	2,260,455	2,504,855	2,802,866	First Step of Expansion suits Base Forecast up to 2020
Probable Forecast	1,743,739	2,018,596	2,576,297	3,288,080	4,196,517	5,355,937	Third Step of Expansion suits Probable Forecast up to 2025
Optimistic Forecast	1,743,739	2,166,242	3,109,920	4,464,893	6,409,644	9,201,873	Fourth Step of Expansion suits Optimistic Forecast up to 2025

TERMINAL	FROM APIVER REPORT		Present Capability projected to 2.5 berths at ~65%± occupancy			Storage turns/year	Assumed Storage Cap. Tons	Storage Throughput Limit tons
	2002 Occupancy	2002 Tonnage	t/y low at ~62%± occupancy	t/y high at ~68%± occupancy	EXISTING EQUIPMENT			
			700,000	770,000	[A] Self-unloading vessels loading trucks/rail-cars			
			700,000	770,000	[B] Self-unloading vessels loading trucks/rail-cars			
			350,000	380,000	[C] Self-unloading vessels loading trucks/rail-cars	[7d. dwell time]		
Unloading at 11 berths	64.9%	1,822,655	1,750,000	1,920,000	"2.5" Berths = Equivalent for 2002	52.1	35,000	1,800,000

TERMINAL	FUTURE ADDITIONS FIRST STEP	PROJECTIONS t/y Low	PROJECTIONS t/y High	EQUIPMENT REQUIREMENTS FIRST STEP EXPANSION	Storage turns/year	Exist.+ *New* Storage Cap.Tons	Storage Throughput Limit tons
Berth #4N L~315m or other berth	No future additions	700,000	770,000	Self-unloading vessels loading trucks/rail-cars	Existing	35,000	Assumed
Berth #4S L~380m or other berth	Install 4 x 250 t/h traveling hoppers and 1000t/h conveyor system	1,700,000	1,780,000	Self-unloading vessels loading traveling hoppers	New storage	*15,000*	
MINERAL TOTAL	AVERAGE: 2,475,000	2,400,000	2,550,000		52.1	50,000	2,610,000

TERMINAL	FUTURE ADDITIONS SECOND STEP	PROJECTIONS t/y Low	PROJECTIONS t/y High	EQUIPMENT REQUIREMENTS SECOND STEP EXPANSION	Storage turns/year	Exist.+ *New* Storage Cap.Tons	Storage Throughput Limit tons
Berth #4N L~315m or other berth	Install 4 x 250 t/h traveling hoppers and 1000t/h conveyor system	1,700,000	1,780,000	Self-unloading vessels loading traveling hoppers	From previous	50,000	
Berth #4S L~380m or other berth	No future additions	1,700,000	1,780,000	Self-unloading vessels loading traveling hoppers	New storage	*20,000*	
MINERAL TOTAL	AVERAGE: 3,480,000	3,400,000	3,560,000		52.1	70,000	3,650,000

TERMINAL	FUTURE ADDITIONS THIRD STEP	PROJECTIONS t/y Low	PROJECTIONS t/y High	EQUIPMENT REQUIREMENTS THIRD STEP EXPANSION	Storage turns/year	Exist.+ *New* Storage Cap.Tons	Storage Throughput Limit tons
Berth #4N L~315m or other berth	Three 600 t/h traveling clamshell unloaders, 2000 t/h conveyors, one truck/rail load-out	3,800,000	4,000,000	Three 600 t/h traveling clamshell unloaders, 2000 t/h conveyor system, three truck/rail load-outs	From previous	70,000	
Berth #4S L~380m or other berth	No future additions	1,700,000	1,780,000	Self-unloading vessels loading traveling hoppers	New storage	*40,000*	
MINERAL TOTAL	AVERAGE: 5,640,000	5,500,000	5,780,000		52.1	110,000	5,740,000

TERMINAL	FUTURE ADDITIONS FOURTH STEP	PROJECTIONS t/y Low	PROJECTIONS t/y High	EQUIPMENT REQUIREMENTS FOURTH STEP EXPANSION	Storage turns/year	Exist.+ *New* Storage Cap.Tons	Storage Throughput Limit tons
Berth #4N L~315m or other berth	No future additions	3,800,000	4,000,000	Three 600 t/h traveling clamshell unloaders, 2000 t/h conveyor system, three truck/rail load-outs	From previous	110,000	5,740,000
Berth #4S L~380m or other berth	Two 600 t/h traveling clamshell unloaders, 1400 t/h conveyors, one truck/rail load-out	2,700,000	2,800,000	Two 600 t/h traveling clamshell unloaders, 1400 t/h conveyor system, two truck/rail load-outs	New storage	*20,000*	*1,040,000*
New Berth at New Location	Two 600 t/h traveling clamshell unloaders, 1400 t/h conveyors, one truck/rail load-out	2,700,000	2,800,000	Two 600 t/h traveling clamshell unloaders, 1400 t/h conveyor system, two truck/rail load-outs	New storage	*55,000*	*2,870,000*
MINERAL TOTAL	AVERAGE: 9,400,000	9,200,000	9,600,000		52.1	185,000	9,650,000

Table C2: Mineral Products Unloading - Actual Operations and Berths Utilized in 2002

Berth No.	2002 Occupancy	Minerals		Scrap		Fertilizer		Minerals+Scrap +Fertilizer		Weighted MINERALS Occupancy
		percent	tons	percent	tons	percent	tons	tons	percent	
1-N	35.2%	3.3%	21,215	0.0%	0	0.0%	0	21,215	1.2%	0.4%
1-S	64.7%	8.5%	54,644	0.0%	0	0.0%	0	54,644	3.0%	1.9%
2-N	55.5%	4.8%	30,858	11.5%	53,375	14.3%	102,237	186,469	10.2%	5.7%
2-S	61.8%	5.2%	33,429	13.5%	62,658	14.3%	102,237	198,323	10.9%	6.7%
4-NP	66.6%	11.0%	70,715	6.0%	27,848	14.3%	102,237	200,800	11.0%	7.3%
4-NR	52.0%	0.0%	0	0.0%	0	14.3%	102,237	102,237	5.6%	2.9%
6-E	65.9%	13.3%	85,501	0.0%	0	14.3%	102,237	187,738	10.3%	6.8%
6-NP	13.0%	0.3%	1,929	0.0%	0	0.0%	0	1,929	0.1%	0.0%
6-NR	69.6%	27.4%	176,146	63.0%	292,403	14.3%	102,237	570,785	31.3%	21.8%
7-S	70.2%	22.0%	141,431	6.0%	27,848	14.3%	102,237	271,515	14.9%	10.5%
7-E	54.1%	4.2%	27,000	0.0%	0	0.0%	0	27,000	1.5%	0.8%
Total		**100.0%**	**642,867**	**100.0%**	**464,132**	**100.0%**	**715,656**	**1,822,655**	**100.0%**	**64.9%**

Notes:
Berth occupancies of various berths in 2002 obtained from APIVER Annual Report "Movimiento de carga y buques";
Total time for 112 vessels at 11 berths in 2002 was 13,600 hours or 566.7 days or 5.06 days per vessel;
Total time at anchorage in 2002 was 3,100 hours or 129.2 days or 1.15 days per vessel;
Percentages of minerals and scrap at each berth obtained from TRAINMAR Report chapter 7.4.1 "TRÁFICO".
Fertilizer unloading operations obtained from TRAINMAR Report chapter 7.5.2, indicating berths 2-N, 2-S, 4-NP, 4NR, 6-E, 6-NR ad 7-S;
Since percentages were not indicated for Fertilizer tonnage at each berth, an equal distribution was made.

Conclusion:
In 2002 the operations for mineral, scrap and fertilizer partially occupied 11 different berths;
The weighted average resulted in a berth occupancy of about 65% for 2002.
Allowing 65% of 350 days available results in 227.5 days occupancy for a dedicated single berth. To unload 1,822,655 tons in 566.7 days, this operation would have required 566.7 / 227.5 = 2.5 dedicated berths in 2002.
A single dedicated berth would have handled 1.823 million / 2.5 berths = 730,000 tons at 65% occupancy.

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Table C-3: Mineral Products Unloading - Summarized Actual Operations 2002

ITEM #	DESCRIPTION	2002 TOTAL	BERTH A	BERTH B	BERTH C PARTIAL		EXPLANATIONS
	Actual annual tonnage 2002	**1.823**	**0.732**	**0.732**	**0.359**	mill.t	Input
1	**Average size of cargo**	**16,274**	**16,261**	**16,261**	**16,326**	tons	Input
2	Number of holds of vessel		4	4	4	holds	Input
3	Unloader design rate		250	250	250	t/h	Input - Vessel mounted
4a	Unloader interference factor		0.90	0.90	0.90	-	For several machines
4b	Truck transfer interference factor		0.39	0.39	0.39	-	For direct truck loading
5a	Number of unloaders		4	4	4	-	Input
5b	Design rate for number of unloaders		348	348	348	t/h	#3x#4ax4bx#5a
6a	Unavailable time at port (weather, maintenance)		15.0	15.0	15.0	d/y	Input Assumption
6b	**Overall port availability**	**96%**	**96%**	**96%**	**96%**		(365 d - #6a)/365
	VESSEL TIME / EVENT						
7	Move vessel to berth and dock		1.0	1.0	1.0	hours	Assumption
8	Customs and paperwork		1.0	1.0	1.0	hours	Assumption
9	Vessel problems		1.0	1.0	1.0	hours	Assumption
10	Unload cargo @ % of design rate:	45%	103.7	103.7	104.1	hours	#1 / ([%]x#5b)
11	Hatch shifting 3 moves/hold [min]	10.0	0.5	0.5	0.5	h/unl.	3x[min]hx#2/(60x5a)
12	Frontloader moves/hold in or out [min]	20.0	0.7	0.7	0.7	h/unl.	2x[min]hx#2/(60x5a)
13	Unloader downtime of # 10,11,12:	5%	5.2	5.2	5.3	hours	[%]x(#10+#11+#12)
14	Vessel shifting 2 moves/hold [h]:	0.0	0.0	0.0	0.0	hours	2 movesx[h]hx#2/5a
15	Downtime due to weather	5%	5.2	5.2	5.3	hours	[%]x(#10+#11+#12)
16	Vessel time/draught survey		1.0	1.0	1.0	hours	Assumption
17	Vessel deberthing and transit time		2.0	2.0	2.0	hours	Assumption
18	Total berth time per vessel		121.3	121.3	121.8	hours	Sum#7 through #17
19	Average unloading rate @ berth time		134	134	134	t/h	#1/#18
20	Average berth unloading rate/design rate		38%	38%	38%		100x(#19/#5b)
21	Operating hours per day (three shifts)		24.0	24.0	24.0	hours	Input Assumption
22	**Berth occupancy per vessel: Tb ***	**5.06**	**5.06**	**5.06**	**5.07**	days	#18/#21
22a	**Berth transfer rate**	**3,216**	**3,216**	**3,216**	**3,217**	t/day	#1/#22
	ANNUAL PROJECTIONS:	**2002 TOTAL**	**BERTH A**	**BERTH B**	**BERTH C PARTIAL**		
23	**Annual tonnage unloaded**	**1.823**	**0.732**	**0.732**	**0.359**	mill.t	Input
24	Number of vessels unloaded	112	45	45	22	vessels	#23/#1
25	Berth occupancy - hours	13,600	5,460	5,460	2,680	hours/yr	24 hx#22x#24
26	Total berth occupancy - days	566.7	227.5	227.5	111.6	days/yr	#22x#24
27	Berth availability - days	350	350	350	350	days/yr	365 - #6a
28	**Berth occupancy (2.5 berths) +**	**65.0%**	**65.0%**	**65.0%**	**31.9%**		100x#26a/(#27xNo.berths)
29	Waiting time factor Tw/Tb calculated ***	0.228	0.228	0.228	0.228	s.chart	40% of random arrival
30	Annual waiting time Tw calculated **	129.2	51.9	51.9	25.4	d/y	#29x#26
31	**Avg. waiting time per vessel: Tw**	**1.15**	**1.15**	**1.15**	**1.16**	days	#30/#24
32	**Total Vessel Time in Port: Tb+Tw**	**6.21**	**6.21**	**6.21**	**6.23**	days	#22 + #31
33	**Port transfer rate**	**2,619**	**2,619**	**2,619**	**2,620**	t/day	#1a/#32

Note: + Total theoretical number of dedicated berth faces is 566.7 days / 227.5 days = "2.5" berths.
Actual operations partially occupied 11 berths at 64.9% weighted average occupancy.
* Total time at 11 berths in 2002 was 13,600 hours or 566.7 days or 5.06 days per vessel = Tb.
** Total time at anchorage in 2002 was 3,100 hours or 129.2 days or 1.15 days per vesse = Tw.
*** Calculated Tw / Tb = 1.15 / 5.06 = 0.228

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Table C-4: Mineral Products Unloading Throughput - Projected for TWO BERTH 65% Occupancy

ITEM #	DESCRIPTION	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	BERTH A LOW	BERTH A HIGH	BERTH B LOW	BERTH B HIGH	BERTH C PARTIAL LOW	BERTH C PARTIAL HIGH		EXPLANATIONS
	Annual tonnage projected	**1.750**	**1.920**	**0.700**	**0.770**	**0.700**	**0.770**	**0.350**	**0.380**	mill.t	Input
1	**Average size of cargo**	**15,909**	**16,696**	**15,909**	**16,739**	**15,909**	**16,739**	**15,909**	**16,522**	tons	Input
2	Number of holds of vessel			4	4	4	4	4	4	holds	Input
3	Unloader design rate			250	250	250	250	250	250	t/h	Input - Vessel mounted
4a	Unloader interference factor			0.90	0.90	0.90	0.90	0.90	0.90	-	For several machines
4b	Truck transfer interference factor			0.39	0.39	0.39	0.39	0.39	0.39	-	For direct truck loading
5a	Number of unloaders			4	4	4	4	4	4	-	Input
5b	Design rate for number of unloaders			348	348	348	348	348	348	t/h	#3x#4ax4bx#5a
6a	Unavailable time at port (weather, maintenance)			15.0	15.0	15.0	15.0	15.0	15.0	d/y	Input Assumption
6b	**Overall port availability**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**		(365 d - #6a)/365
	VESSEL TIME / EVENT										
7	Move vessel to berth and dock			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
8	Customs and paperwork			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
9	Vessel problems			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
10	Unload cargo @ % of design rate:		45%	101.1	106.4	101.1	106.4	101.1	105.0	hours	#1 / ([%]x#5b)
11	Hatch shifting 3 moves/hold [min]		10.0	0.5	0.5	0.5	0.5	0.5	0.5	h/unl.	3x[min]hx#2/(60x5a)
12	Frontloader moves/hold in or out [min]		20.0	0.7	0.7	0.7	0.7	0.7	0.7	h/unl.	2x[min]hx#2/(60x5a)
13	Unloader downtime of # 10,11,12:		5%	5.1	5.4	5.1	5.4	5.1	5.3	hours	[%]x(#10+#11+#12)
14	Vessel shifting 2 moves/hold [h]:		0.0	0.0	0.0	0.0	0.0	0.0	0.0	hours	2 movesx[h]hx#2/5a
15	Downtime due to weather		5%	5.1	5.4	5.1	5.4	5.1	5.3	hours	[%]x(#10+#11+#12)
16	Vessel time/draught survey			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
17	Vessel deberthing and transit time			2.0	2.0	2.0	2.0	2.0	2.0	hours	Assumption
18	Total berth time per vessel			118.5	124.3	118.5	124.3	118.5	122.8	hours	Sum#7 through #17
19	Average unloading rate @ berth time			134	135	134	135	134	135	t/h	#1/#18
20	Average berth unloading rate/design rate			39%	39%	39%	39%	39%	39%		100x(#19/#5b)
21	Operating hours per day (three shifts)			24.0	24.0	24.0	24.0	24.0	24.0	hours	Input Assumption
22	**Berth occupancy per vessel: Tb**	**4.94**	**5.17**	**4.94**	**5.18**	**4.94**	**5.18**	**4.94**	**5.12**	days	#18/#21
22a	**Berth transfer rate**	**3,222**	**3,231**	**3,222**	**3,232**	**3,222**	**3,232**	**3,222**	**3,229**	t/day	#1/#22
	ANNUAL PROJECTIONS:	**OVERALL TOTAL LOW**	**OVERALL TOTAL HIGH**	**BERTH A LOW**	**BERTH A HIGH**	**BERTH B LOW**	**BERTH B HIGH**	**BERTH C PARTIAL LOW**	**BERTH C PARTIAL HIGH**		
23	**Annual tonnage unloaded**	**1.750**	**1.920**	**0.700**	**0.770**	**0.700**	**0.770**	**0.350**	**0.380**	mill.t	Input
24	Number of vessels unloaded	110	115	44	46	44	46	22	23	vessels	#23/#1
25	Berth occupancy - hours	13,035	14,260	5,214	5,718	5,214	5,718	2,607	2,824	hours/yr	24 hx#22x#24
26	Total berth occupancy - days	543	594	217	238	217	238	109	118	days/yr	#22x#24
27	Berth availability - days	350	350	350	350	350	350	350	350	days/yr	365 - #6a
28	**Berth occupancy (2.5 berths) +**	**62.3%**	**68.2%**	**62.1%**	**68.1%**	**62.1%**	**68.1%**	**31.0%**	**33.6%**		100x#26a/(#27xNo.berths)
29	Waiting time factor Tw/Tb assumed	0.201	0.262	0.201	0.262	0.201	0.262	0.201	0.262	s.chart	40% of random arrival
30	Annual waiting time Tw calculated *	109.1	155.5	43.6	62.3	43.6	62.3	21.8	30.8	d/y	#29x#26
31	**Avg. waiting time per vessel: Tw**	**0.99**	**1.35**	**0.99**	**1.36**	**0.99**	**1.36**	**0.99**	**1.34**	days	#30/#24
32	**Total Vessel Time in Port: Tb+Tw**	**5.93**	**6.52**	**5.93**	**6.53**	**5.93**	**6.53**	**5.93**	**6.45**	days	#22 + #31
33	**Port transfer rate**	**2,683**	**2,561**	**2,683**	**2,562**	**2,683**	**2,562**	**2,683**	**2,560**	t/day	#1a/#32

Note: +Total theoretical number of berth faces assumed as "TWO and ONE HALF" Berths

Table C-5: Mineral Products Unloading Throughputy - First Step of Future Expansion

ITEM #	DESCRIPTION	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	BERTH #4N LOW	BERTH #4N HIGH	BERTH #4S LOW	BERTH 4S HIGH		EXPLANATIONS
	Future annual tonnage Base	**2.400**	**2.550**	**0.700**	**0.770**	**1.700**	**1.780**	mill.t	Input
1	**Average size of cargo**	**16,667**	**17,114**	**16,279**	**17,111**	**16,832**	**17,115**	tons	Input
2	Number of holds of vessel			4	4	4	4	holds	Input
3	Unloader design rate			250	250	250	250	t/h	Input
4a	Unloader interference factor			0.90	0.90	0.90	0.90	-	For several machines
4b	Truck transfer interference factor			0.39	0.39	1.00	1.00	-	For direct truck loading
5a	Number of unloaders			4	4	4	4	-	Input
5b	Design rate for number of unloaders			348	348	900	900	t/h	#3x#4ax4bx#5a
6a	Unavailable time at port (weather, maintenance)			15.0	15.0	15.0	15.0	d/y	Input Assumption
6b	**Overall port availability**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**		(365 d - #6a)/365
	VESSEL TIME / EVENT								
7	Move vessel to berth and dock			1.0	1.0	1.0	1.0	hours	Assumption
8	Customs and paperwork			1.0	1.0	1.0	1.0	hours	Assumption
9	Vessel problems	#6N	#7S	1.0	1.0	1.0	1.0	hours	Assumption
10	Unload cargo @ % of design rate:	45%	45%	103.8	109.1	41.6	42.3	hours	#1 / ([%]x#5b)
11	Hatch shifting 3 moves/hold [min]	10.0	10.0	0.5	0.5	0.5	0.5	h/unl.	3x[min]hx#2/(60x5a)
12	Frontloader moves/hold in or out [min]	20.0	20.0	0.7	0.7	0.7	0.7	h/unl.	2x[min]hx#2/(60x5a)
13	Unloader downtime of # 10,11,12:	5%	5%	5.2	5.5	2.1	2.2	hours	[%]x(#10+#11+#12)
14	Vessel shifting 2 moves/hold [h]:	0.0	0.0	0.0	0.0	0.0	0.0	hours	2 movesx[h]hx#2/5a
15	Downtime due to weather	5%	5%	5.2	5.5	2.1	2.2	hours	[%]x(#10+#11+#12)
16	Vessel time/draught survey			1.0	1.0	1.0	1.0	hours	Assumption
17	Vessel deberthing and transit time			2.0	2.0	2.0	2.0	hours	Assumption
18	Total berth time per vessel			121.5	127.3	53.0	53.8	hours	Sum#7 through #17
19	Average unloading rate @ berth time			134	134	318	318	t/h	#1/#18
20	Average berth unloading rate/design rate			38%	39%	35%	35%		100x(#19/#5b)
21	Operating hours per day (three shifts)			24.0	24.0	24.0	24.0	hours	Input Assumption
22	**Berth occupancy per vessel: Tb**	**3.06**	**3.17**	**5.06**	**5.30**	**2.21**	**2.24**	days	#18/#21
22a	**Berth transfer rate**	**5,446**	**5,406**	**3,216**	**3,226**	**7,622**	**7,639**	t/day	#1/#22
	ANNUAL PROJECTIONS:	**OVERALL TOTAL LOW**	**OVERALL TOTAL HIGH**	**BERTH A LOW**	**BERTH A HIGH**	**BERTH B LOW**	**BERTH B HIGH**		
23	Annual tonnage unloaded	2.400	2.550	0.700	0.770	1.700	1.780	mill.t	Input

Table C-6: Mineral Products Unloading Throughput - Second Step of Future Expansion

ITEM #	DESCRIPTION	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	BERTH #4N LOW	BERTH #4N HIGH	BERTH #4S LOW	BERTH 4S HIGH		EXPLANATIONS
	Future annual tonnage Base	**3.400**	**3.560**	**1.700**	**1.780**	**1.700**	**1.780**	mill.t	Input
1	**Average size of cargo**	**16,832**	**17,115**	**16,832**	**17,115**	**16,832**	**17,115**	tons	Input
2	Number of holds of vessel			4	4	4	4	holds	Input
3	Unloader design rate			250	250	250	250	t/h	Input
4a	Unloader interference factor			0.90	0.90	0.90	0.90	-	For several machines
4b	Truck transfer interference factor			1.00	1.00	1.00	1.00	-	For direct truck loading
5a	Number of unloaders			4	4	4	4	-	Input
5b	Design rate for number of unloaders			900	900	900	900	t/h	#3x#4ax4bx#5a
6a	Unavailable time at port (weather, maintenance)			15.0	15.0	15.0	15.0	d/y	Input Assumption
6b	**Overall port availability**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**		(365 d - #6a)/365
	VESSEL TIME / EVENT								
7	Move vessel to berth and dock			1.0	1.0	1.0	1.0	hours	Assumption
8	Customs and paperwork			1.0	1.0	1.0	1.0	hours	Assumption
9	Vessel problems	#6N	#7S	1.0	1.0	1.0	1.0	hours	Assumption
10	Unload cargo @ % of design rate:	45%	45%	41.6	42.3	41.6	42.3	hours	#1 / ([%]x#5b)
11	Hatch shifting 3 moves/hold [min]	10.0	10.0	0.5	0.5	0.5	0.5	h/unl.	3x[min]hx#2/(60x5a)
12	Frontloader moves/hold in or out [min]	20.0	20.0	0.7	0.7	0.7	0.7	h/unl.	2x[min]hx#2/(60x5a)
13	Unloader downtime of # 10,11,12:	5%	5%	2.1	2.2	2.1	2.2	hours	[%]x(#10+#11+#12)
14	Vessel shifting 2 moves/hold [h]:	0.0	0.0	0.0	0.0	0.0	0.0	hours	2 movesx[h]hx#2/5a
15	Downtime due to weather	5%	5%	2.1	2.2	2.1	2.2	hours	[%]x(#10+#11+#12)
16	Vessel time/draught survey			1.0	1.0	1.0	1.0	hours	Assumption
17	Vessel deberthing and transit time			2.0	2.0	2.0	2.0	hours	Assumption
18	Total berth time per vessel			53.0	53.8	53.0	53.8	hours	Sum#7 through #17
19	Average unloading rate @ berth time			318	318	318	318	t/h	#1/#18
20	Average berth unloading rate/design rate			35%	35%	35%	35%		100x(#19/#5b)
21	Operating hours per day (three shifts)			24.0	24.0	24.0	24.0	hours	Input Assumption
22	**Berth occupancy per vessel: Tb**	**2.21**	**2.24**	**2.21**	**2.24**	**2.21**	**2.24**	days	#18/#21
22a	**Berth transfer rate**	**7,622**	**7,639**	**7,622**	**7,639**	**7,622**	**7,639**	t/day	#1/#22
	ANNUAL PROJECTIONS:	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	BERTH A LOW	BERTH A HIGH	BERTH B LOW	BERTH B HIGH		
23	**Annual tonnage unloaded**	**3.400**	**3.560**	**1.700**	**1.780**	**1.700**	**1.780**	mill.t	Input
24	Number of vessels unloaded	202	208	101	104	101	104	vessels	#23/#1
25	Berth occupancy - hours	10,706	11,184	5,353	5,592	5,353	5,592	hours/yr	24 hx#22x#24
26	Total berth occupancy - days	446	466	223	233	223	233	days/yr	#22x#24
27	Berth availability - days	350	350	350	350	350	350	days/yr	365 - #6a
28	**Berth occupancy (2 berths) +**	**63.7%**	**66.6%**	**63.7%**	**66.6%**	**63.7%**	**66.6%**		100x#26a/(#27xNo.berths)
29	Waiting time factor Tw/Tb assumed	0.216	0.244	0.216	0.244	0.216	0.244	s.chart	40% of random arrival
30	Annual waiting time Tw calculated	96.2	113.9	48.1	56.9	48.1	56.9	d/y	#29x#26
31	**Avg. waiting time per vessel: Tw**	**0.48**	**0.55**	**0.48**	**0.55**	**0.48**	**0.55**	days	#30/#24
32	**Total Vessel Time in Port: Tb+Tw**	**2.68**	**2.79**	**2.68**	**2.79**	**2.68**	**2.79**	days	#22 + #31
33	**Port transfer rate**	**6,270**	**6,139**	**6,270**	**6,139**	**6,270**	**6,139**	t/day	#1a/#32

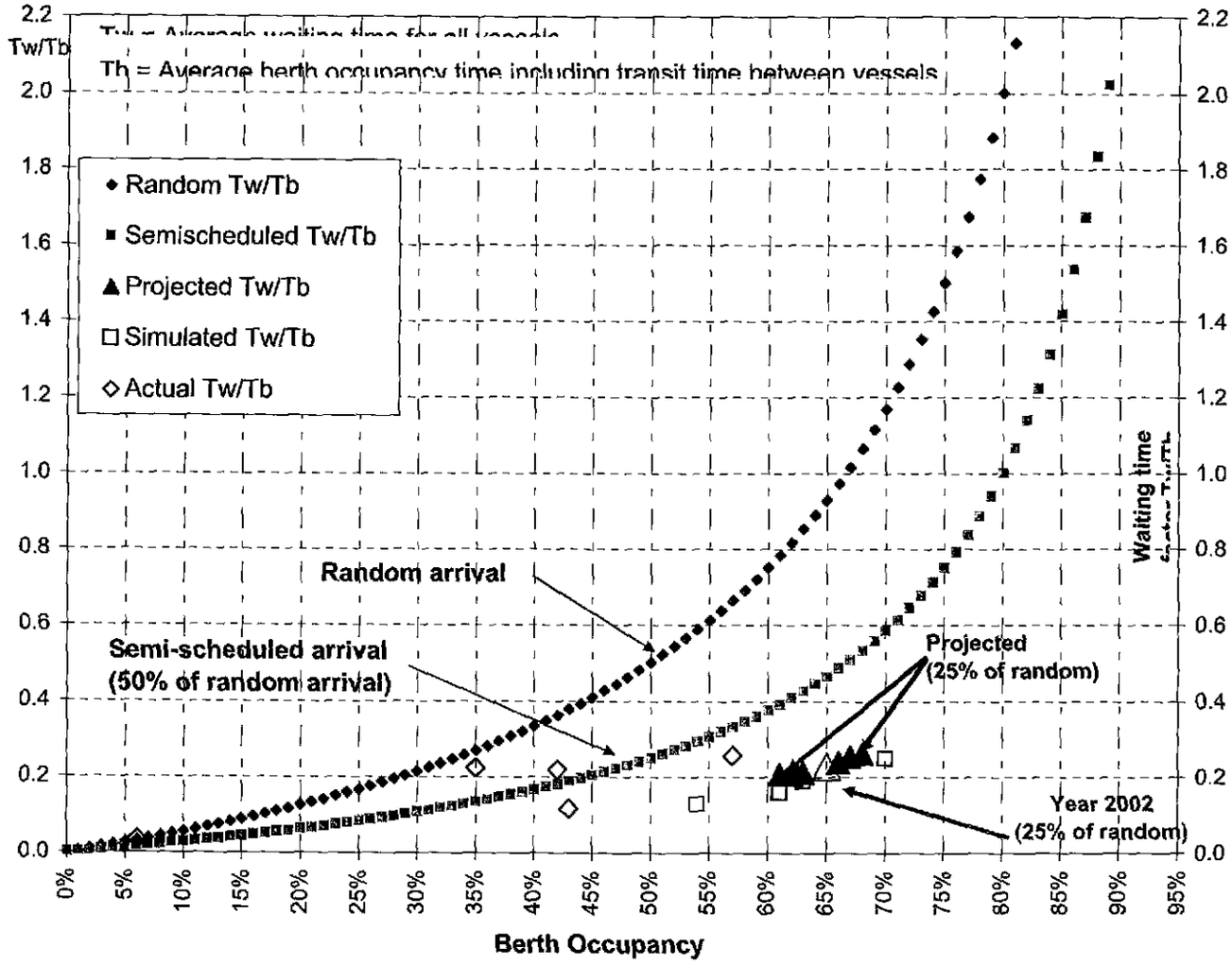
Table C-7: Mineral Products Unloading Throughput -Third Step of Future Expansion

ITEM #	DESCRIPTION	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	BERTH #4N LOW	BERTH #4N HIGH	BERTH #4S LOW	BERTH 4S HIGH		EXPLANATIONS
	Future annual tonnage Base	**5.500**	**5.780**	**3.800**	**4.000**	**1.700**	**1.780**	mill.t	Input
1	**Average size of cargo**	**23,013**	**23,496**	**27,536**	**28,169**	**16,832**	**17,115**	tons	input
2	Number of holds of vessel			5	5	4	4	holds	Input
3	Unloader design rate			600	600	250	250	t/h	Input
4a	Unloader interference factor			0.93	0.93	0.90	0.90	-	For several machines
4b	Truck transfer interference factor			1.00	1.00	1.00	1.00	-	For direct truck loading
5a	Number of unloaders			3	3	4	4	-	Input
5b	Design rate for number of unloaders			1,674	1,674	900	900	t/h	#3x#4ax4bx#5a
6a	Unavailable time at port (weather, maintenance)			15.0	15.0	15.0	15.0	d/y	Input Assumption
6b	**Overall port availability**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**		(365 d - #6a)/365
	VESSEL TIME / EVENT								
7	Move vessel to berth and dock			1.0	1.0	1.0	1.0	hours	Assumption
8	Customs and paperwork			1.0	1.0	1.0	1.0	hours	Assumption
9	Vessel problems	#6N	#7S	1.0	1.0	1.0	1.0	hours	Assumption
10	Unload cargo @ % of design rate:	60%	45%	27.4	28.0	41.4	42.1	hours	#1 / ([%]x#5b)
11	Hatch shifting 3 moves/hold [min]	10.0	10.0	0.8	0.8	0.5	0.5	h/unl.	3x[min]hx#2/(60x5a)
12	Frontloader moves/hold in or out [min]	20.0	20.0	1.1	1.1	0.7	0.7	h/unl.	2x[min]hx#2/(60x5a)
13	Unloader downtime of # 10,11,12:	5%	5%	1.5	1.5	2.1	2.2	hours	[%]x(#10+#11+#12)
14	Vessel shifting 2 moves/hold [h]:	0.0	0.0	0.0	0.0	0.0	0.0	hours	2 movesx[h]hx#2/5a
15	Downtime due to weather	5%	5%	1.5	1.5	2.1	2.2	hours	[%]x(#10+#11+#12)
16	Vessel time/draught survey			1.0	1.0	1.0	1.0	hours	Assumption
17	Vessel deberthing and transit time			2.0	2.0	2.0	2.0	hours	Assumption
18	Total berth time per vessel			38.3	39.0	52.8	53.6	hours	Sum#7 through #17
19	Average unloading rate @ berth time			719	722	318	319	t/h	#1/#18
20	Average berth unloading rate/design rate			43%	43%	35%	35%		100x(#19/#5b)
21	Operating hours per day (three shifts)			24.0	24.0	24.0	24.0	hours	Input Assumption
22	**Berth occupancy per vessel: Tb**	**1.85**	**1.88**	**1.60**	**1.62**	**2.20**	**2.23**	days	#18/#21
22a	**Berth transfer rate**	**12,427**	**12,483**	**17,257**	**17,340**	**7,644**	**7,661**	t/day	#1/#22
	ANNUAL PROJECTIONS:	**OVERALL TOTAL LOW**	**OVERALL TOTAL HIGH**	**BERTH A LOW**	**BERTH A HIGH**	**BERTH B LOW**	**BERTH B HIGH**		
23	**Annual tonnage unloaded**	**5.500**	**5.780**	**3.800**	**4.000**	**1.700**	**1.780**	mill.t	Input
24	Number of vessels unloaded	239	246	138	142	101	104	vessels	#23/#1
25	Berth occupancy - hours	10,622	11,112	5,285	5,536	5,338	5,576	hours/yr	24 hx#22x#24
26	Total berth occupancy - days	443	463	220	231	222	232	days/yr	#22x#24
27	Berth availability - days	350	350	350	350	350	350	days/yr	365 - #6a
28	**Berth occupancy (3 berths) +**	**63.2%**	**66.1%**	**62.9%**	**65.9%**	**63.5%**	**66.4%**		100x#26a/(#27xNo.berths)
29	Waiting time factor Tw/Tb assumed	0.211	0.240	0.208	0.237	0.214	0.242	s.chart	40% of random arrival
30	Annual waiting time Tw calculated	93.4	111.0	45.8	54.7	47.6	56.3	d/y	#29x#26
31	**Avg. waiting time per vessel: Tw**	**0.39**	**0.45**	**0.33**	**0.39**	**0.47**	**0.54**	days	#30/#24
32	**Total Vessel Time in Port: Tb+Tw**	**2.24**	**2.33**	**1.93**	**2.01**	**2.67**	**2.78**	days	#22 + #31
33	**Port transfer rate**	**10,261**	**10,069**	**14,283**	**14,015**	**6,297**	**6,167**	t/day	#1a/#32

Table C-8: Mineral Products Unloading Throughput -Fourth Step of Future Expansion

		Existing Port						New Port			
ITEM #	DESCRIPTION	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	BERTH #4N LOW	BERTH #4N HIGH	BERTH #4S LOW	BERTH 4S HIGH	NEW BERTH LOW	NEW BERTH HIGH		EXPLANATIONS
	Future annual tonnage Base	**9.200**	**9.600**	**3.800**	**4.000**	**2.700**	**2.800**	**2.700**	**2.800**	mill.t	Input
1	**Average size of cargo**	**26,437**	**26,966**	**27,536**	**28,169**	**25,714**	**26,168**	**25,714**	**26,168**	tons	Input
2	Number of holds of vessel			5	5	5	5	5	5	holds	Input
3	Unloader design rate			600	600	600	600	600	600	t/h	Input
4a	Unloader interference factor			0.93	0.93	0.96	0.96	0.96	0.96	-	For several machines
4b	Truck transfer interference factor			1.00	1.00	1.00	1.00	1.00	1.00	-	For direct truck loading
5a	Number of unloaders			3	3	2	2	2	2	-	Input
5b	Design rate for number of unloaders			1,674	1,674	1,152	1,152	1,152	1,152	t/h	#3x#4ax4bx#5a
6a	Unavailable time at port (weather, maintenance)			15.0	15.0	15.0	15.0	15.0	15.0	d/y	Input Assumption
6b	**Overall port availability**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**		(365 d - #6a)/365
	VESSEL TIME / EVENT										
7	Move vessel to berth and dock			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
8	Customs and paperwork			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
9	Vessel problems	#6N	#7S	1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
10	Unload cargo @ % of design rate:	60%	60%	27.4	28.0	37.2	37.9	37.2	37.9	hours	#1 / ([%]x#5b)
11	Hatch shifting 3 moves/hold [min]	10.0	10.0	0.8	0.8	1.3	1.3	1.3	1.3	h/unl.	3x[min]hx#2/(60x5a)
12	Frontloader moves/hold in or out [min]	20.0	20.0	1.1	1.1	1.7	1.7	1.7	1.7	h/unl.	2x[min]hx#2/(60x5a)
13	Unloader downtime of # 10,11,12:	5%	5%	1.5	1.5	2.0	2.0	2.0	2.0	hours	[%]x(#10+#11+#12)
14	Vessel shifting 2 moves/hold [h]:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	hours	2 movesx[h]hx#2/5a
15	Downtime due to weather	5%	5%	1.5	1.5	2.0	2.0	2.0	2.0	hours	[%]x(#10+#11+#12)
16	Vessel time/draught survey			1.0	1.0	1.0	1.0	1.0	1.0	hours	Assumption
17	Vessel deberthing and transit time			2.0	2.0	2.0	2.0	2.0	2.0	hours	Assumption
18	Total berth time per vessel			38.3	39.0	50.1	50.9	50.1	50.9	hours	Sum#7 through #17
19	Average unloading rate @ berth time			719	722	513	515	513	515	t/h	#1/#18
20	Average berth unloading rate/design rate			43%	43%	45%	45%	45%	45%		100x(#19/#5b)
21	Operating hours per day (three shifts)			24.0	24.0	24.0	24.0	24.0	24.0	hours	Input Assumption
22	**Berth occupancy per vessel: Tb**	**1.89**	**1.92**	**1.60**	**1.62**	**2.09**	**2.12**	**2.09**	**2.12**	days	#18/#21
22a	**Berth transfer rate**	**13,964**	**14,032**	**17,257**	**17,340**	**12,311**	**12,350**	**12,311**	**12,350**	t/day	#1/#22
	ANNUAL PROJECTIONS:	OVERALL TOTAL LOW	OVERALL TOTAL HIGH	BERTH A LOW	BERTH A HIGH	BERTH B LOW	BERTH B HIGH	NEW BERTH LOW	NEW BERTH HIGH		
23	**Annual tonnage unloaded**	**9.200**	**9.600**	**3.800**	**4.000**	**2.700**	**2.800**	**2.700**	**2.800**	mill.t	Input
24	Number of vessels unloaded	348	356	138	142	105	107	105	107	vessels	#23/#1
25	Berth occupancy - hours	15,812	16,419	5,285	5,536	5,264	5,441	5,264	5,441	hours/yr	24 hx#22x#24
26	Total berth occupancy - days	659	684	220	231	219	227	219	227	days/yr	#22x#24
27	Berth availability - days	350	350	350	350	350	350	350	350	days/yr	365 - #6a
28	**Berth occupancy (3 berths) +**	**62.7%**	**65.2%**	**62.9%**	**65.9%**	**62.7%**	**64.8%**	**62.7%**	**64.8%**		100x#26a/(#27xNo.berths)
29	Waiting time factor Tw/Tb assumed	0.207	0.230	0.208	0.237	0.206	0.226	0.206	0.226	s.chart	40% of random arrival
30	Annual waiting time Tw calculated	136.2	157.1	45.8	54.7	45.2	51.2	45.2	51.2	d/y	#29x#26
31	**Avg. waiting time per vessel: Tw**	**0.39**	**0.44**	**0.33**	**0.39**	**0.43**	**0.48**	**0.43**	**0.48**	days	#30/#24
32	**Total Vessel Time in Port: Tb+Tw**	**2.28**	**2.36**	**1.93**	**2.01**	**2.52**	**2.60**	**2.52**	**2.60**	days	#22 + #31
33	**Port transfer rate**	**11,572**	**11,412**	**14,283**	**14,015**	**10,208**	**10,076**	**10,208**	**10,076**	t/day	#1a/#32

Figure No. C-9: Berth - Waiting Time Factors Tw/Tb at % Berth Occupancy - Year 2002 and Projections



Mineral Unloading	2002	Projected at 65% 2.5 Berth Total		Frist Step 2 Berth Total		Second Step 2 Berth Total		Third Step 2 Berth Total		Fourth Step 3 Berth Total	
	Total	Low	High	Low	High	Low	High	Low	High	Low	High
Throughput million tpy	1.823	1.750	1.920	2.400	2.550	3.400	3.560	5.500	5.780	9.200	9.600
Average cargo size t	16,274	15,909	16,696	16,667	17,114	16,832	17,115	23,013	23,496	26,437	26,966
Number of Vessels	112	110	115	144	149	202	208	239	246	348	356
Berth Occupancy %	**65%**	**62%**	**68%**	**63%**	**67%**	**62%**	**67%**	**63%**	**66%**	**63%**	**65%**
Waiting Tw days	1.15	0.99	1.35	0.64	0.80	0.48	0.55	0.39	0.45	0.39	0.44
Berthing Tb days	5.06	4.94	5.17	3.06	3.17	2.21	2.24	1.85	1.88	1.89	1.92
Projected Tw/Tb	**0.228**	**0.201**	**0.262**	**0.209**	**0.254**	**0.216**	**0.244**	**0.211**	**0.240**	**0.207**	**0.230**
Previous Projects											
Berth Occupancy %	54%	61%	63%	70%							
Simulated Tw/Tb	0.130	0.160	0.190	0.250							
Previous Projects					VENT3	VENT2	VENT5	ECT95	ECT94	KENAI	
Berth Occupancy %					6%	35%	43%	42%	62%	57%	
Actual Tw/Tb					0.035	0.225	0.117	0.220	0.210	0.258	

Table C-10: DESCRIPTION OF CHART – FIGURE No. C-9

The chart is based on statistical equations.* The ratio of average waiting time Tw over average berthing time Tb of all vessels over one year is shown as a function of the berth occupancy percentage.

Two equations (Tw/Tb) related to % berth occupancy have been plotted:

- One for random arrival of vessels
- One for semi-scheduled arrival of vessels [values Tw/Tb equal to 50% of random values]

As can be seen from Figure C-9, the waiting time factor increases exponentially for both functions as the berth occupancy reaches values above 65%. This means that berth occupancies above 65% will result in significantly higher ship waiting times and higher demurrage costs.

It can also be noted that a higher degree of scheduling of vessel arrivals will lead to less vessel waiting time, which would make higher berth occupancies possible at tolerable vessel waiting times. Waiting time is also a function of the number of berths. The more berths are available in a port, the lower the statistical waiting time.

The chart shows plotted entries of actual operations from previous projects as "ACTUAL Tw / Tb". Results of previous computer simulations for various projects are also shown. These are identified as "SIMULATED Tw/Tb". Most of these simulations were based on a higher degree of scheduled vessel arrivals. Especially for higher berth occupancies they show waiting time factors Tw/Tb significantly below the 50% semi-scheduled arrival pattern.

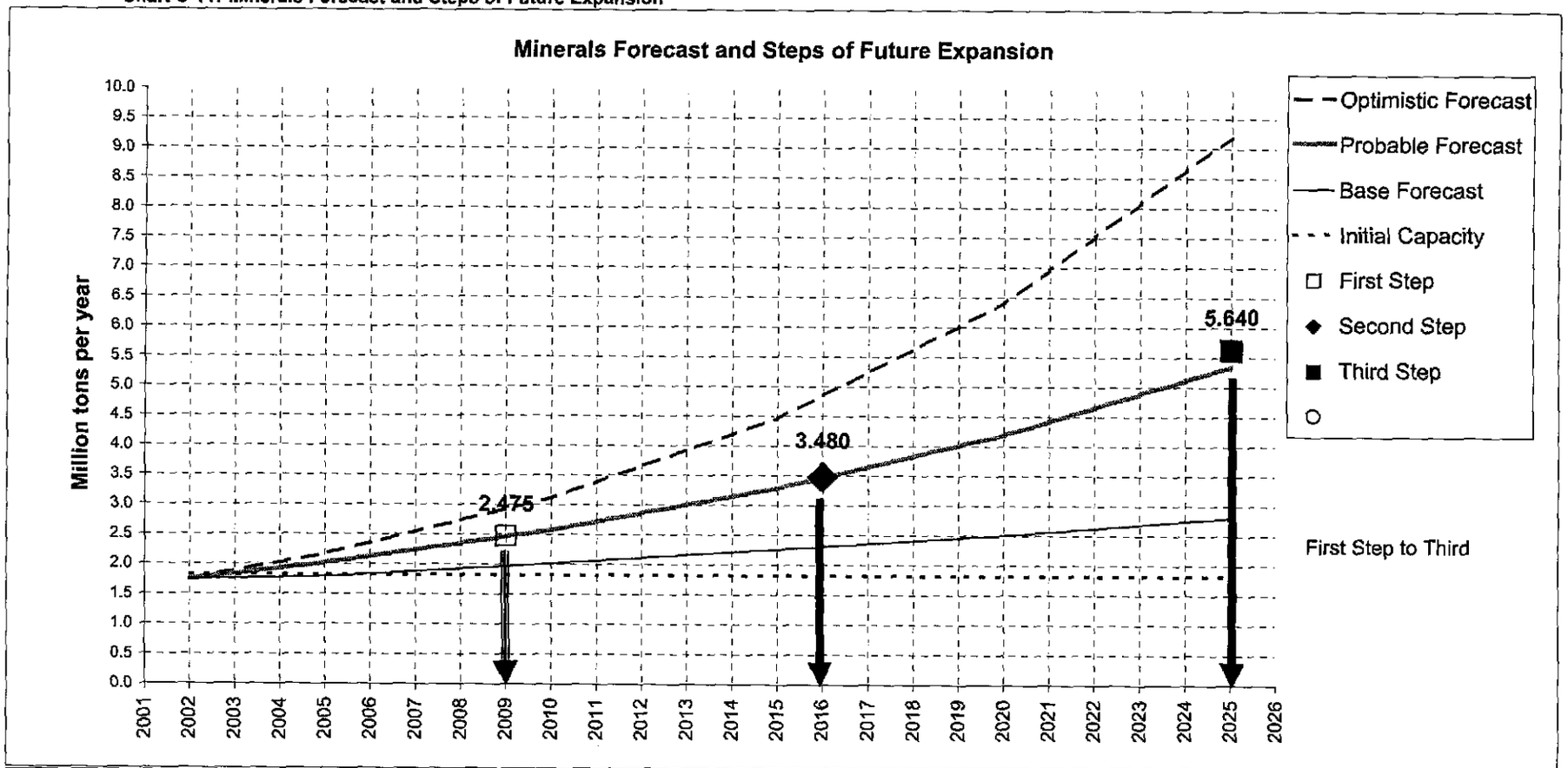
For Mineral Unloading Operations in 2002, the average waiting time Tw was 1.15 days/vessel and the average berth time Tb was 5.06 days per vessel unloading mineral products with an actual average berth occupancy of 65% partially using 11 berths. When the Tw/Tb = 0.228 was entered into the chart C-0, it was determined that the vessel arrival pattern had a 25% degree of scheduling. This scheduled arrival pattern [Tw/Tb is equal to 25% of random arrival values] has been used for all future operations at the existing and new facilities.

* Note: Equations were developed by J.D. Mettam, as published in
THE DOCK & HARBOUR AUTHORITY - APRIL 1967 - PAGES 380 T0 382

USTDA - Veracruz Terminal Expansion Study

June 17, 2005
by: K.Kroeter

Chart C-11: Minerals Forecast and Steps of Future Expansion



	2002	2005	2006	2007	2008	**2009**	2010	2011	2012	2013	2014	2015	**2016**	2017	2018	2019	2020	2021	2022	2023	2024	**2025**
Base Forecast	1.744	1.789	1.834	1.879	1.924	1.969	2.014	2.063	2.112	2.162	2.211	2.260	2.309	2.358	2.407	2.456	2.505	2.564	2.624	2.684	2.743	2.803
Probable Forecast	**1.744**	**2.019**	**2.130**	**2.242**	**2.353**	**2.465**	**2.576**	**2.719**	**2.861**	**3.003**	**3.146**	**3.288**	**3.470**	**3.651**	**3.833**	**4.015**	**4.197**	**4.428**	**4.660**	**4.892**	**5.124**	**5.356**
Optimistic Forecast	1.744	2.166	2.355	2.544	2.732	2.921	3.110	3.381	3.652	3.923	4.194	4.465	4.854	5.243	5.632	6.021	6.410	6.968	7.527	8.085	8.643	9.202
Initial Capacity	1.823	1.823	1.823	1.823	1.823	1.823	1.823	1.823	1.823	1.823	1.823	1.823	1.823	1.823	1.823	1.823	1.823	1.823	1.823	1.823	1.823	1.823
First Step						**2.475**																
Second Step													**3.480**									
Third Step																						**5.640**

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Appendix-D

Task 9 Operating Cost Summary

A multi layered cost model was developed for Veracruz to estimate the equipment, labor and management requirements for each of the container forecasts. Based on current industry trends, individual costs were determined and those numbers were used in the cost model to estimate the overall costs. Costs have no consideration for currency variation or inflation. Capital and facility costs have no consideration for taxes.

The management and labor rates used to develop the variable costs are listed below. It is intended that these salary costs include all appropriate benefits, insurance and local taxes, as required by local or national laws.

Position	Annual Salary
Terminal Manager	$ 77,500
Terminal Operations Manager	$ 50,500
Terminal Operations Supervisor	$ 44,500
Marine Operations Manager	$ 46,500
Stowage Clerk	$ 19,500
Yard Coordinator	$ 17,000
Maintenance Manager	$ 36,500
Maintenance Supervisor	$ 28,000
Administration Manager	$ 25,000
Secretary	$ 7,000
Administration Supervisor	$ 25,000
Administration Clerk	$ 14,000
Marine Clerk	$ 14,000

Position	Annual Salary
Crane / RTG operator	$ 19,600
Dock Boss	$ 22,500
Maintenance Foreman	$ 21,500
Maintenance Labor	$ 10,300
Dock Labor	$ 10,300
Truck Driver	$ 10,300
Forklift Operator	$ 10,300
Checker	$ 9,300

Equipment purchase price as well as operating costs, are included in the following table.

Equipment Operating Costs					
		Equipment Type			
Cost Category	Units	Shore Crane	RTG	Empty Handler	Tractor & Chassis
Fuel	gal/hr	15	5	2	1
Fuel cost	$/gal	1.5	1.5	1.5	1.5
Oil	gal/hr	2	0.5	0.2	0.01
Oil cost	$/gal	1.75	1.75	1.75	1.75
Spare parts	Initial Cost	2%	2%	2%	2%
Insurance	Initial Cost	1%	0.5%	0.5%	0.1%
Initial Cost	$	7,000,000	2,000,000	400,000	100,000

To determine replacement costs, the following economic life was used for each type of equipment.

Equipment Type	Economic Life (years)
Shore Crane	30
Rubber Tired Gantry Crane (RTG)	20
Empty Handler	15
Tractor	10
Chassis	30
Utility Truck	10

Development of the new Port facility varies for each forecast scenario. The pace of this development proceeds slowly under the "base case" scenario and is much faster under the "optimistic case." Facility spending will follow this same pace and has been reflected in each of the three cost summary tables.

The sequence of berth and terminal construction is driven by the cargo forecast scenario as well as the relocation of the existing container operations to new facilities, as discussed more fully within Task 5. The table below offers a quick reference for new terminal capacity. It is assumed that construction will be initiated in a timely manner to insure that new capacity can begin operation in the year listed.

Forecast Scenario	**Initial Operation**					**Total # of Berths**
Base Case	'15x3	'25				4
Probable Case	'10	'15x2	'21			4
Optimistic Case '09	'10x2	'15	'18	'21	'23	7

The CICE terminal lease will expire Jan 1, 2018 and the ICAVE terminal lease will expire on July 28, 2015. While it may be possible that these terminal operators will be successful in extending their concessions, a conservative approach has been taken for the purpose of this financial analysis, assuming that a new operator will be selected. As a result of this assumption, the cost of new equipment has been incorporated into the cost model.

With consideration for the term of their existing terminal lease, it has been assumed that the CICE operations will complete relocation to the new port facilities in the year listed below. While it is possible that CICE may be awarded a new operational concession, the cost of new equipment has been included in the capital cost summary to more accurately reflect the cost impact of a new operator.

Base Case	2015
Probable Case	2010
Optimistic Case	2010

The ICAVE operations will be concluded in 2015, when their concession expires. In the Base Case and the Probable case, they will not relocate to the new port facility. However, in the Optimistic case ICAVE will relocate to the new port facilities and begin operations there in 2010. While it is possible that ICAVE may be awarded a new operational concession, the cost of new equipment has been included in the capital cost summary to more accurately reflect the cost impact of a new operator.

Base Case 2015
Probable Case 2015
Optimistic Case 2010

The tables included on the next three pages, provide separate totals for each forecast. Within each table individual totals are shown for,

$ Variable cost and variable cost/TEU
$ Equipment cost, including replacement costs
$ Facility cost

Total Operating Cost Summary
Base Case

	2002	2005	2010	2015	2020	2025
Variable Costs						
Manpower	$12,125,511	$13,521,310	$15,881,011	$19,848,625	$22,245,415	$27,526,031
Fuel	$937,645	$1,045,580	$1,227,212	$1,383,279	$1,545,654	$1,804,966
Oil	$103,970	$115,939	$135,621	$152,393	$169,782	$197,699
Spare parts	$1,373,000	$1,373,000	$1,377,000	$1,653,000	$1,657,000	$1,797,000
Insurance	$546,000	$546,000	$546,200	$697,500	$697,700	$731,900
Utility costs	$328,994	$366,866	$468,585	$585,653	$718,582	$889,159
Total Variable Costs	$15,415,121	$16,968,694	$19,635,629	$24,320,450	$27,034,133	$32,946,755
Cost/TEU	$28.11	$27.75	$25.14	$24.92	$22.57	$22.23
Capital Costs						
Shore Cranes	$0	$0	$0	$49,000,000	$0	$0
Replacement	$0	$0	$0	$0	$0	$0
Rubber Tired Gantry (RTG)	$0	$0	$0	$38,000,000	$0	$6,000,000
Replacement	$0	$0	$0	$0	$0	$0
Empty Handler	$0	$0	$0	$2,400,000	$0	$800,000
Replacement	$0	$0	$0	$0	$0	$0
Tractor	$0	$0	$140,000	$3,710,000	$140,000	$140,000
Replacement	$0	$0	$0	$0	$140,000	$3,710,000
Chassis	$0	$0	$210,000	$1,590,000	$210,000	$60,000
Replacement	$0	$0	$0	$0	$0	$0
Utility Truck	$0	$0	$20,000	$20,000	$0	$0
Replacement	$0	$0	$0	$0	$20,000	$20,000
Equipment Total	$0	$0	$370,000	$94,720,000	$510,000	$10,730,000

Total Operating Cost Summary
Probable Case

Total Operating Cost Summary	**2002**	**2005**	**2010**	**2015**	**2020**	**2025**
Variable Costs						
Manpower	$12,125,511	$14,438,500	$17,765,015	$23,777,522	$29,080,227	$35,768,530
Fuel	$937,645	$1,116,505	$1,372,800	$1,657,090	$2,026,518	$2,561,604
Oil	$103,970	$115,803	$131,710	$182,558	$152,543	$180,647
Spare parts	$1,377,000	$1,373,000	$1,770,000	$1,657,000	$1,879,000	$2,657,000
Insurance	$546,000	$546,000	$768,100	$697,700	$753,000	$1,110,700
Utility costs	$328,994	$391,751	$524,174	$701,579	$939,764	$1,258,774
Total Variable Costs	$15,415,121	$17,989,560	$22,751,700	$28,673,440	$34,809,751	$43,636,724
Cost/TEU	$28.11	$27.55	$25.59	$24.52	$22.29	$20.81
Capital Costs						
Shore Cranes	$0	$0	$21,000,000	$28,000,000	$0	$28,000,000
Replacement	$0	$0	$0	$0	$0	$0
Rubber Tired Gantry (RTG)	$0	$0	$42,000,000	$14,000,000	$14,000,000	$35,000,000
Replacement	$0	$0	$0	$0	$0	$0
Empty Handler	$0	$0	$800,000	$1,600,000	$800,000	$1,200,000
Replacement	$0	$0	$0	$0	$0	$0
Tractor	$0	$0	$1,750,000	$1,540,000	$420,000	$2,380,000
Replacement	$0	$0	$0	$0	$1,470,000	$1,820,000
Chassis	$0	$0	$1,020,000	$780,000	$340,000	$810,000
Replacement	$0	$0	$0	$0	$0	$0
Utility Truck	$0	$0	$20,000	$20,000	$0	$0
Replacement	$0	$0	$0	$0	$20,000	$20,000
Equipment Total	$0	$0	$38,590,000	$55,940,000	$12,950,000	$48,230,000
Replacement	$0	$0	$0	$0	$20,000	$20,000
Equipment Total	$0	$0	$97,210,000	$30,420,000	$43,180,000	$80,940,000

USTDA APIVER Feasibility Study for the Veracruz Port Expansion Project
Container Terminal Development at Bay of Vergara

Construction Costs of a New Container Terminal - Phase 1
2 berth container terminal
Facilities: 1. Wharf, 2. Container Yard, 3. Gate Complex, 4. Intermodal Yard (Not considered in Phase 1)

1 Wharf

Size of wharf:		360
Container gage:		30.5
Water depth:		16.5
Maximum container ship:		14,500
Across the deck:		22
Planned wharf fender line:	at existing MSL shore line	

Description	Quantity	Units	Unit cost	Total cost	1 berth Total cost	2 berths	3 berths
1.A General Construction							
a Earthwork Preparation for Deck	24,000	m2	$ 42	$ 1,008,000	$ 604,800	$ 1,209,600	$ 1,814,400
b Main Deck	22,800	m2	$ 500	$ 11,400,000	6,840,000	13,680,000	20,520,000
c Gravity Retaining Wall	620	m2	$ 2,600	$ 1,612,000	967,200	1,934,400	2,901,600
d Bridge Slab	2,160	m2	$ 260	$ 561,600	336,960	673,920	1,010,880
e Structural and Misc. Metals	120,000	kg	$ 40	$ 4,800,000	2,880,000	5,760,000	8,640,000
f Crane Rail and Accessaries	590	m	$ 660	$ 389,400	233,640	467,280	700,920
g Concrete Pavement	19,200	m2	$ 90	$ 1,728,000	1,036,800	2,073,600	3,110,400
h Utilities	1	LS	$ 1,800,000	$ 1,800,000	1,080,000	2,160,000	3,240,000
i Pavement Markings and Signage	1	LS	$ 220,000	$ 220,000	132,000	264,000	396,000
j Storm Water Drainage	1	LS	$ 400,000	$ 400,000	240,000	480,000	720,000
k Bollards	24	EA	$ 10,000	$ 240,000	144,000	288,000	432,000
l Fenders	20	EA	$ 12,000	$ 240,000	144,000	288,000	432,000
				$ 24,399,000	**14,639,400**	**29,278,800**	**43,918,200**
1.B Foundation Construction							
Earthwork Preparation for Drilled Shafts	24,000	m2	$ 12	$ 288,000	172,800	345,600	518,400
b Drilled Shafts	38,000	m	$ 500	$ 19,000,000	11,400,000	22,800,000	34,200,000
c Miscellaneous	1	LS	$ 550,000	$ 550,000	330,000	660,000	990,000
				$ 19,838,000	**$ 11,902,800**	**23,805,600**	**35,708,400**
1.C Dredging							
Mobilization/Demobilization	1	LS	$ 450,000	$ 450,000	270,000	540,000	810,000
b Dry Excavation	54,600	m3	$ 3	$ 163,800	98,280	196,560	294,840
c Dry Material Dredge and Place	95,500	m3	$ 4	$ 382,000	229,200	458,400	687,600
d Wet Material Dredge and Place	409,500	m3	$ 11	$ 4,504,500	2,702,700	5,405,400	8,108,100
e Install Drainage System	1	LS	$ 180,000	$ 180,000	108,000	216,000	324,000
f Maintain Drainage System	25	months	$ 6,000	$ 150,000	90,000	180,000	270,000
				$ 5,830,300	**$ 3,498,180**	**6,996,360**	**10,494,540**
1.D Shore Protection							
Slope Protection, including Geotextile Filter, Crushed Stone Filter Layer, Stone Riprap Revetment	25,000	m2	$ 180	$ 4,500,000	2,700,000	5,400,000	8,100,000
Wharf Structure Total				**$ 54,567,300**	**$ 32,740,380**	**65,480,760**	**98,221,140**

2 Container Yard

Area 600 m x 800 m

Description	Quantity	Units	Unit cost	Total cost	1 berth Total cost	2 berths	3 berths
2.A Clearing, Grubbing, Grading							
a Clear, Grub, Rough Grade to Drain	48	hectare	$ 3,000	$ 144,000	86,400	172,800	259,200
b Disposal of Organic Materials	48	hectare	$ 9,000	$ 432,000	259,200	518,400	777,600
c Compaction	48	hectare	$ 10,000	$ 480,000	288,000	576,000	864,000
d Grading & Base Course	48	hectare	$ 160,000	$ 7,680,000	4,608,000	9,216,000	13,824,000
				$ 8,736,000	**$ 5,241,600**	**10,483,200**	**15,724,800**
2.B Fencing and Paving							
a Fencing	2200	m	$ 60	$ 132,000	79,200	158,400	237,600
b Paving concrete blocks at RTG & top pick areas	20	hectare	$ 350,000	$ 7,000,000	4,200,000	8,400,000	12,600,000
c Paving asphalt concrete at wheeled/empties areas	24	hectare	$ 250,000	$ 6,000,000	3,600,000	7,200,000	10,800,000
d Paving concrete at gate areas, RTG runway	4	hectare	$ 450,000	$ 1,800,000	1,080,000	2,160,000	3,240,000
e Striping, Signage	1	LS	$ 68,000	$ 68,000	40,800	81,600	122,400
				$ 15,000,000	**$ 9,000,000**	**18,000,000**	**27,000,000**
2.C Utilities							
a Domestic Water System	700	m	$ 70	$ 49,000	29,400	58,800	88,200
b Fire Water System	2400	m	$ 120	$ 288,000	172,800	345,600	518,400
c Storm Water Drainage incl. Manholes, Catch Basins	4000	m	$ 300	$ 1,200,000	720,000	1,440,000	2,160,000
d Lighting & Power	48	hectare	$ 50,000	$ 2,400,000	1,440,000	2,880,000	4,320,000
e Other Services	1	LS	$ 400,000	$ 400,000	240,000	480,000	720,000
				$ 4,337,000	**$ 2,602,200**	**5,204,400**	**7,806,600**
Container Yard Total				**$ 28,073,000**	**$ 16,843,800**	**33,687,600**	**50,531,400**

The table below outlines the cost estimates for the Veracruz Southern Container Terminal.

VERACRUZ SOUTHERN CONTAINER TERMINAL

DEVELOPMENT COST

	2010 - PHASE 1				2015 - PHASE 2			
ITEM	UNIT	UNIT COST	QTY	TOTAL COST	UNIT	UNIT COST	QTY	TOTAL COST
Mobilization	LS	200000	1	$ 200,000	LS		1	$ 100,000
Main wharf structure								
Deck	m3	$ 860	8,145	$ 7,004,700				
Beams & capitals	m3	$ 860	2,214	$ 1,904,040				
Piles 36"ODx0.75"	m	$ 951	13,590	$ 12,924,100				
Wharf pavement	m3	$ 402	3,665	$ 1,473,400				
Slope revetment	m3	$ 60	12,600	$ 756,000				
Slope filter layer	m3	$ 40	4,200	$ 168,000				
				$ 24,230,240				NOT REQUIRED
Wharf outfitting								
Ship fender panels	ea	$ 18,000	27	$ 486,000				
Bollards	ea	$ 6,000	27	$ 162,000				
Crane rail	m	$ 620	690	$ 427,800				
Panzerbelt	m	$ 820	340	$ 278,800				
Tie downs	ea	$ 9,000	32	$ 288,000				
Stowage pins	ea	$ 5,000	16	$ 80,000				
End stopers	ea	$ 6,000	4	$ 24,000				
Exp. Joints	m	$ 200	420	$ 84,000				
Bridging Slab	m2	$ 400	1400	$ 560,000				
Conduits, wharf outlets and boxes	LS	$ 400,000	1	$ 400,000				
Potable water (wharf)	LS	$ 125,000	1	$ 125,000				
				$ 2,915,600				
WHARF DEVELOPMENT TOTAL				$ 27,345,840				NOT REQUIRED
Cellular Cofferdam								
Retaining Structure	T	$ 1,500	5120	$ 7,680,000				
Compacted Fill	m3	$ 12	230000	$ 2,760,000				
Coping Deck	m3	$ 430	7500	$ 3,225,000				
				$ 13,665,000				
Upland development								
Fill and surcharge material for upland	m3	$ 12	450000	$ 5,400,000	m3	$ 15	1000	$ 15,000
Overpass piling					m	$ 450	1000	$ 450,000
Dynamic compaction	LS	$ 1,350,000	1	$ 1,350,000				
Grading + base course operational area	He	$ 175,000	3.5	$ 612,500				
Concrete paving operational area	He	$ 387,500	0.5	$ 193,750				
Asphalt paving operational area	He	$ 87,500	13	$ 1,137,500				
Road paving + base course	He	$ 187,500	0.5	$ 93,750	He	$ 187,500	0.5	$ 93,750
Fence & secondary gate	m	$ 150	750	$ 112,500				
Storm sewer	LS	$ 440,000	1	$ 440,000				
Fire water system	LS	$ 50,000	1	$ 50,000				
Electrical substation & control ctr/ distribution	LS	$ 160,000	1	$ 160,000				
Light poles	ea	$ 33,000	20	$ 660,000				
Electrical power cable for cranes	m	$ 58	0	with cranes				
Sewage and potable water	LS	$ 80,000	1	$ 80,000				
Striping/ Pavement marking/ signage	LS	$ 60,000	1	$ 60,000	LS	$ 20,000	1	$ 20,000
Flyover overpass connecting to container yard ICAVE					m2	$ 3,000	550	$ 1,650,000
				$ 10,350,000				$ 2,228,750
Equipment								
Portal container cranes 22-boxes Post Panamax	ea	$ 7,000,000	2	$ 14,000,000	ea	$ 7,000,000	1	$ 7,000,000
RTG's	ea	$ 2,000,000	2	$ 4,000,000	ea	$ 2,000,000	4	$ 8,000,000
Tracktors -yard	ea	$ 60,000	17	$ 1,020,000	ea	$ 60,000	16	$ 960,000
Top lifters	ea	$ 350,000	2	$ 700,000	ea	$ 350,000	2	$ 700,000
Chassies	ea	$ 27,000	20	$ 540,000	ea	$ 27,000	20	$ 540,000
Empty handlers	ea	$ 200,000	2	$ 400,000	ea	$ 200,000	6	$ 1,200,000
				$ 20,660,000				$ 18,400,000
Construction			TOTAL	$ 72,020,840			TOTAL	$ 20,728,750
Engineering &construction management of Port Facilities				$ 5,755,900				$ 784,900
		TOTAL OF PHASE 1		$ 77,776,740		TOTAL OF PHASE 2		$ 21,513,650

VERACRUZ SOUTHERN CONTAINER TERMINAL

	USD Milions	
	Phase I	Phase II
Main wharf structure	24.2	
Wharf outfitting	2.9	
Cellular Cofferdam	13.7	
Upland development	10.4	2.2
Equipment	20.7	18.4
Engineering and Construction management	5.8	0.8
Total	77.8	21.5

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Appendix E – Estimated Dredging Costs for Bahia de Vergara Phase 1 Development

Estimated Dredging Costs for Bahia de Vergara Phase 1 Development

Dredging volumes by area	Dredged Depth m	Length m	Width m	Diameter	Slopes	Aver. Depth of Dredging m	Quantity m3	Estimated Cost USD
Access channel	18	1500	400		1:3	4.5	2,791,000	
Maneuvering basin	17			700	1:3	9	3,731,000	
Inner channel	16.5	1000	250		1:3	10.5	2,956,000	
Inner maneuvering basin	16.5			600	1:3	10	3,110,000	
Wedge area near B1 and B2	16.5				1:3	11	1,617,000	
Wedge area near B3 and B4	16.5				1:3	11	1,155,000	
Total dredging volume							15,360,000	
						Unit Cost USD/ m3		
						$ 7.50		115,200,000
Dredger Mobilization								700,000
								115,900,000
Contingency						10%		11,590,000
Total estimated Cost								127,490,000

Note: Dredging is to be performed by a large dredger, working around the clock at the unit cost of $7.50/m3.
It is estimated, that the entire dredged volume will be placed locally, whether on the land area of B1 through B4, or adjacent areas.

$12,299,000 for Phase 2 (additional berths).

Job: Port of Veracruz
No: 046105856
Comp: HF

Date: 11/24/2004
Ckd:
Sheet: 1 **of** 6

Port of Veracruz - Bahia de Vergara Northwestern Breakwater (Cross Section Calc.)

Material	Total Cross Section (m^2)
Armorstone # 1	148.20
Armorstone # 2	196.75
Total Armorstone	344.95
Total Core-loc	55.98
Core-Loc (10.18 ton)	55.98
Core-Loc (8.27 ton)	0.00

Section =	#1
Top Elev. =	+10.5
Bot. Elev. =	-9.5

Material Type	Elev. (M) Top	Elev. (M) Bot.	D (M)	Slop	Height (M)	Width (M)	Length (M)	Material Type I Cross Section A(M^2)	Material Type II Cross Section A(M^2)	Material Type III Cross Section A(M^2)
1	2.00	-9.50	2.00	1.50	11.50	17.25	20.73	41.46	0.00	0.00
1	8.00	2.00	2.00	1.50	6.00	9.00	10.82	21.63	0.00	0.00
2	10.50	2.00	2.50	1.50	8.50	12.75	15.32	0.00	38.31	0.00
1	2.00	2.00	2.00	0.00	0.00	4.00	4.00	8.00	0.00	0.00
1	8.00	8.00	2.00	0.00	0.00	9.28	9.28	18.56	0.00	0.00
2	10.50	10.50	2.50	0.00	0.00	11.50	11.50	0.00	28.75	0.00
1	8.00	6.50	2.00	1.50	1.50	2.25	2.70	5.41	0.00	0.00
2	10.50	6.50	2.50	1.50	4.00	6.00	7.21	0.00	18.03	0.00
1	6.50	-9.50	2.00	1.50	16.00	24.00	28.84	57.69	0.00	0.00
2	6.50	-7.50	1.50	1.50	14.00	21.00	25.24	0.00	37.86	0.00
3	6.50	-5.00	2.70	1.50	11.50	17.25	20.73	0.00	0.00	55.98
1	-7.50	-7.50	2.00	0.00	0.00	16.10	22.00	44.00	0.00	0.00
2	-5.00	-5.00	2.50	0.00	0.00	10.10	10.10	0.00	25.25	0.00
						Total (m^2)		196.75	148.20	55.98

Port of Veracruz - Bahia de Vergara Northwestern Breakwater (Cross Section Calc.)

Material	Total Cross Section (m^2)
Armorstone # 1	168.03
Armorstone # 2	221.01
Total Armorstone	389.04
Total Core-loc	75.45
Core-Loc (10.18 ton)	75.45
Core-Loc (8.27 ton)	0.00

Section =	#1
Top Elev. =	+11.5
Bot. Elev. =	-13.5

Material Type	Elev. (M) Top	Elev. (M) Bot.	D (M)	Slop	Height (M)	Width (M)	Length (M)	Material Type I Cross Section A(M^2)	Material Type II Cross Section A(M^2)	Material Type III Cross Section A(M^2)
1	2.00	-13.50	2.00	1.50	15.50	23.25	27.94	55.89	0.00	0.00
1	9.00	2.00	2.00	1.50	7.00	10.50	12.62	25.24	0.00	0.00
2	11.50	2.00	2.50	1.50	9.50	14.25	17.13	0.00	42.82	0.00
1	2.00	2.00	2.00	0.00	0.00	4.00	4.00	8.00	0.00	0.00
1	9.00	9.00	2.00	0.00	0.00	9.28	9.28	18.56	0.00	0.00
2	11.50	11.50	2.50	0.00	0.00	11.50	11.50	0.00	28.75	0.00
1	9.00	6.50	2.00	1.50	2.50	3.75	4.51	9.01	0.00	0.00
2	11.50	6.50	2.50	1.50	5.00	7.50	9.01	0.00	22.53	0.00
1	6.50	-13.50	2.00	1.50	20.00	30.00	36.06	72.11	0.00	0.00
2	6.50	-11.50	1.50	1.50	18.00	27.00	32.45	0.00	48.67	0.00
3	6.50	-9.00	2.70	1.50	15.50	23.25	27.94	0.00	0.00	75.45
1	-13.50	-13.50	2.00	0.00	0.00	16.10	16.10	32.20	0.00	0.00
2	-11.50	-11.50	2.50	0.00	0.00	10.10	10.10	0.00	25.25	0.00
						Total (m^2)		221.01	168.03	75.45

Port of Veracruz - Bahia de Vergara Northwestern Breakwater (Cross Section Calc.)

Material	Total Cross Section (m^2)
Armorstone # 1	163.47
Armorstone # 2	179.94
Total Armorstone	343.41
Total Core-Loc	103.22
Core-Loc (10.18 ton)	55.98
Core-Loc (8.27 ton)	47.25

Section =	#2
Top Elev. =	+10.5
Bot. Elev. =	-9.5

Material Type	Elev. (M) Top	Elev. (M) Bot.	D (M)	Slop	Height (M)	Width (M)	Length (M)	Material Type I Cross Section A(M^2)	Material Type II Cross Section A(M^2)	Material Type III Cross Section A(M^2)
1	2.00	-9.50	2.00	1.50	11.50	17.25	20.73	41.46	0.00	0.00
1	8.00	2.00	2.00	1.50	6.00	9.00	10.82	21.63	0.00	0.00
2	10.50	2.00	2.50	1.50	8.50	12.75	15.32	0.00	38.31	0.00
1	6.00	6.00	2.00	0.00	0.00	8.00	8.00	16.00	0.00	0.00
2	10.50	10.50	2.50	0.00	0.00	11.50	11.50	0.00	28.75	0.00
1	2.00	2.00	2.00	0.00	0.00	4.00	4.00	8.00	0.00	0.00
1	8.00	6.00	2.00	1.50	2.00	3.00	3.61	7.21	0.00	0.00
2	10.50	6.00	2.50	1.50	4.50	6.75	8.11	0.00	20.28	0.00
1	6.00	-9.50	2.00	1.50	15.50	23.25	27.94	55.89	0.00	0.00
2	6.00	-8.00	1.50	1.50	14.00	21.00	25.24	0.00	37.86	0.00
3	6.00	-5.50	2.70	1.50	11.50	17.25	20.73	0.00	0.00	55.98
1	-9.50	-9.50	1.00	0.00	0.00	14.00	14.00	14.00	0.00	0.00
1	-9.50	-9.50	1.50	0.00	0.00	10.50	10.50	15.75	0.00	0.00
2	-7.00	-7.00	2.50	0.00	0.00	8.60	8.60	0.00	21.50	0.00
3	-3.70	-3.70	2.50	0.00	0.00	6.60	6.60	0.00	0.00	16.50
3	-3.00	-8.50	2.50	2.00	5.50	11.00	12.30	0.00	0.00	30.75
2	-8.50	-5.50	2.50	2.00	-3.00	-6.00	6.71	0.00	16.77	0.00
						Total (m^2)		179.94	163.47	103.22

Port of Veracruz - Bahia de Vergara Northwestern Breakwater (Cross Section Calc.)

Material	Total Cross Section (m^2)
Armorstone # 1	87.59
Armorstone # 2	178.80
Total Armorstone	266.39
Total Core-loc	93.78
Core-Loc (10.18 ton)	68.14
Core-Loc (8.27 ton)	25.64

Section =	#3
Top Elev.	+11.0
Bot. Elev.	-9.5

Material Type	Elev. (M) Top	Elev. (M) Bot.	D (M)	Slop	Height (M)	Width (M)	Length (M)	Material Type I Cross Section A(M^2)	Material Type II Cross Section A(M^2)	Material Type III Cross Section A(M^2)
1	2.00	-9.50	2.00	1.50	11.50	17.25	20.73	41.46	0.00	0.00
1	8.50	2.00	2.00	1.50	6.50	9.75	11.72	23.44	0.00	0.00
2	11.00	2.00	2.50	1.50	9.00	13.50	16.22	0.00	40.56	0.00
1	2.00	2.00	2.00	0.00	0.00	4.00	4.00	8.00	0.00	0.00
2	11.00	11.00	2.50	0.00	0.00	10.70	10.70	0.00	26.75	0.00
1	8.50	8.50	2.00	0.00	0.00	8.00	8.00	16.00	0.00	0.00
1	8.50	-9.50	2.00	1.50	18.00	27.00	32.45	64.90	0.00	0.00
2	11.00	6.50	2.50	1.50	4.50	6.75	8.11	0.00	20.28	0.00
3	6.50	-7.50	2.70	1.50	14.00	21.00	25.24	0.00	0.00	68.14
3	7.50	7.50	2.50	0.00	0.00	6.90	6.90	0.00	0.00	17.25
1	9.50	9.50	2.00	0.00	0.00	9.00	9.00	18.00	0.00	0.00
1	9.50	9.50	1.00	0.00	0.00	7.00	7.00	7.00	0.00	0.00
3	-7.00	-8.50	2.50	2.00	1.50	3.00	3.35	0.00	0.00	8.39
						Total (m^2)		178.80	87.59	93.78

Port of Veracruz - Bahia de Vergara Northwestern Breakwater (Cross Section Calc.)

Material	Cross Section (m^2)
Armorstone # 1	85.34
Armorstone # 2	59.27
Total Armorstone	144.61
Total Core-loc	19.47
Core-Loc (10.18 ton)	0.00
Core-Loc (8.27 ton)	0.00

Section =	#3
Top Elev. =	+11.0
Bot. Elev. =	+2.5

Material Type	Elev. (M) Top	Elev. (M) Bot.	D (M)	Slop	Height (M)	Width (M)	Length (M)	Material Type I Cross Section A(M^2)	Material Type II Cross Section A(M^2)	Material Type III Cross Section A(M^2)
1	8.50	2.50	2.00	1.50	6.00	9.00	10.82	21.63	0.00	0.00
2	11.00	2.50	2.50	1.50	8.50	12.75	15.32	0.00	38.31	0.00
2	11.00	11.00	2.50	0.00	0.00	10.70	10.70	0.00	26.75	0.00
1	8.50	8.50	2.00	0.00	0.00	8.00	8.00	16.00	0.00	0.00
1	8.50	2.50	2.00	1.50	6.00	9.00	10.82	21.63	0.00	0.00
2	11.00	6.50	2.50	1.50	4.50	6.75	8.11	0.00	20.28	0.00
3	6.50	2.50	2.70	1.50	4.00	6.00	7.21	0.00	0.00	19.47
						Total (m^2)		59.27	85.34	19.47

Port of Veracruz - Bahia de Vergara Northwestern Breakwater
(Cross Section Calc.)

Core material

Section 1	Elev. -13.5	
Top of core Elev	7.00	m
Shelf Elev.	0.00	m
Width of crown	8.00	m
Slope	1.50	
Base Elev lowest	-13.50	m
Base Elev highest	-9.50	m
Cross section top	129.50	m2
Cross section bottom	705.38	m2
Total	**834.88**	

Section 1	Elev. -9.5	
Top of core Elev	6.00	m
Shelf Elev.	0.00	m
Width of crown	8.00	m
Slope	1.50	
Base Elev lowest	-9.50	m
Base Elev highest	-9.50	m
Cross section top	102.00	m2
Cross section bottom	410.88	m2
Total	**512.88**	

Section 2	Elev. -9.5	
Top of core Elev	6.00	m
Shelf Elev.	0.00	m
Width of crown	8.00	m
Slope	1.50	
Base Elev lowest	-9.50	m
Base Elev highest	-9.50	m
Cross section top	102.00	m2
Cross section bottom	410.88	m2
Total	**512.88**	

Section 3	Elev. -9.5	
Top of core Elev	6.50	m
Shelf Elev.	0.00	m
Width of crown	8.00	m
Slope	1.50	
Base Elev lowest	-9.50	m
Base Elev highest	-9.50	m
Cross section top	115.38	m2
Cross section bottom	425.13	m2
Total	**540.50**	

Cost Estimate

Segment III

Section - 2

For Armorstone

L =	2150.00	m
Natural sea bottom level =	-9.50	m
Cross section area =	345.00	m^2
Volume =	741,750	m^3
Weight =	1,223,888	ton
Unit price =	191.32	peso / ton
Unit price =	16.93	$ / ton
Total Price =	$20,721,607	

For Core-Loc (Type 1,W=10.18 ton)

Cross section area =	56.00	m^2
Volume =	120,400	m^3
Weight =	169,764	ton
Unit price =	12417.18	peso / piece
Unit price =	1098.87	$ / piece
Total Price =	$18,324,931	

For Core-Loc (Type 2,W=8.27 ton)

Cross section area =	48.00	m^2
Volume =	103,200	m^3
Weight =	145,512	ton
Unit price =	10212.82	peso / piece
Unit price =	903.79	$ / piece
Total Price =	$15,902,322	

For Core Material fill

Cross section area =	513.00	m^2
Volume =	1,102,950	m^3
Weight =	1,808,838	ton
Unit price (70%) =	195.41	peso / ton
Unit price =	17.29	$ / ton
Unit price (30%) =	177.58	peso / ton
Unit price =	15.72	$ / ton
Total Price =	$30,423,855	

TOTAL PRICE OF SEGMENT III = $85,372,715

Cost Estimate

Segment II

Section - 1

For Armorstone

L =	800.00	m
Natural sea bottom level =	from -9.5 to -13.5	m
Cross section area =	367.00	m^2
Volume =	293,600	m^3
Weight =	484,440	ton
Unit price =	191.32	peso / ton
Unit price =	16.93	$ / ton
Total Price =	$8,202,041	

For Core-Loc (Type 1,W=10.18 ton)

Cross section area =	66.00	m^2
Volume =	52,800	m^3
Weight =	74,448	ton
Unit price =	12417.18	peso / piece
Unit price =	1098.87	$ / piece
Total Price =	$8,036,182	

For Core-Loc (Type 2,W=8.27 ton)

Cross section area =	0.00	m^2
Volume =	0.00	m^3
Weight =	0.00	ton
Unit price =	10212.82	peso / piece
Unit price =	903.79	$ / piece
Total Price =	$0	

For Core Material fill

Cross section area =	675.00	m^2
Volume =	540,000	m^3
Weight =	885,600	ton
Unit price (70%) =	195.41	peso / ton
Unit price =	17.29	$ / ton
Unit price (30%) =	177.58	peso / ton
Unit price =	15.72	$ / ton
Total Price =	$14,895,400	

TOTAL PRICE OF SEGMENT III = $31,133,623

Cost Estimate

Segment I-A

Section - 3

For Armorstone

L =	550.00	m
Natural sea bottom level =	from -5.0 to -9.5	m
Cross section area =	205.00	m^2
Volume =	112,750	m^3
Weight =	186,038	ton
Unit price =	191.32	peso / ton
Unit price =	16.93	$ / ton
Total Price =	$3,149,796	

For Core-Loc (Type 1,W=10.18 ton)

Cross section area =	52.00	m^2
Volume =	28,600	m^3
Weight =	40,326	ton
Unit price =	12417.18	peso / piece
Unit price =	1098.87	$ / piece
Total Price =	$4,352,932	

For Core-Loc (Type 2,W=8.27 ton)

Cross section area =	20.00	m^2
Volume =	11000.00	m^3
Weight =	15510.00	ton
Unit price =	10212.82	peso / piece
Unit price =	903.79	$ / piece
Total Price =	$1,695,015	

For Core Material fill

Cross section area =	410.00	m^2
Volume =	225,500	m^3
Weight =	369,820	ton
Unit price (70%) =	195.41	peso / ton
Unit price =	17.29	$ / ton
Unit price (30%) =	177.58	peso / ton
Unit price =	15.72	$ / ton
Total Price =	$6,220,209	

TOTAL PRICE OF SEGMENT III = $15,417,952

Segment I-B

IS HALF PRICE OF SEGMENT I-A

Job:	Port of Veracruz	**Date:** 11/30/2004
No:	046105856	**Ckd:**
Comp:	HF	**Sheet:** 4 **of** 4

Cost Estimate Summary

SUMMARY	SEGMENT I		SEGMENT II	SEGMENT III	TOTAL
	A	B			
LENGTH	550	550	800	2150	4050 (m)
ARMORSTONE	$3,149,796	$1,574,898	$8,202,041	$20,721,607	$33,648,342
CORE-LOC (10.18)	$4,352,932	$2,176,466	$8,036,182	$18,324,931	$32,890,511
CORE-LOC (8.27)	$1,695,015	$847,508	$0.00	$15,902,322	$18,444,845
CORE FILL	$6,220,209	$3,110,105	$14,895,400	$30,423,855	$54,649,569
TOTAL	$15,417,952	$7,708,976	$31,133,623	$85,372,715	$139,633,266

DMJM HARRIS | AECOM

VERACRUZ

Appendix F – Bibliography

Index of previous studies relevant to the expansion of the Port of Veracruz in the Federal area of Bahía de Vergara

N° Name of the Study Period of Execution Contractor

% of completion when considered during present study

1 **Topobathymetic Survey of the Port of Veracruz in the Federal area of Bay of Vergara** October 1 to November 19, 2001, Prepared by SEAPROD, completed.

2 **Study of Regional Environmental Impact for the Expansion and Development Works of the Port of Veracruz, Ver.., in the Federal area of Bay of Vergara**, September 28 2001 to February 13, 2002, PROCOMAR, completed.

3 **Video filming and elaboration of report of punctual prospecting in time of flora and fauna in the reef of Punta Gorda,** February 13 to 22, 2002, PROCOMAR, completed.

4 **Studies of Oceanography for the Expansion of the Port of Veracruz in the Federal Area of Bay Vergara that includes numeric modeling for studies of agitation, hydrodynamics of the coast, design and executive project of breakwater and protection works.** September 26 to December, 2001, Comisión Federal de Electicidad, completed study.

5 **Studies of Geotechnics for the Expansion of the Port of Veracruz in the Federal Area of Bay of Vergara,** October 25 to December 7, 2001, Comisión Federal de Electricidad, completed study.

6 **Study for the Expansion and Development of the Port of Veracruz, Ver. in the Federal Area of Bay of Vergara**, October 16 to December 31, 2001, INOPESA, completed study.

7 **Works of Topography, Geoseismics, Bathymetry and Environmental Impact Statement for Exploitation of the Banks of Materials, Port and Area of Deposit of the Materials resulting from Dredging in the Area of Balzapote, Necessary for the Expansion Project of the Port.** February 1, 2002 to June 1, 2002, Comisión Federal de Electricidad, completed.

8 **Campaign of Measurements of Surf and Currents in the Federal Area of Bay of Vergara, Ver.,** March 1 to December 31, 2002, Comisión Federal de Electricidad, 90% complete.

9 **Elaboration and Promotion before the Environmental and Legislative Authorities of the Veracruz Reef Management Program.** March 25 to September 25, 2002, SIGEA, 100% complete.

10 **Studies in Hydraulic Models to define the constructive projects of the breakwater of protection of the expansion of the port of Veracruz, Ver.** 19 of April 19, 2002 to March 31, 2003, Instituto Mexicano de Transporte, 55% complete when considered during present study.

11 **"Construction of the Hydraulic Models of Stability of Breakwater and Wave Action, as well as Production of Molds and Design of Mixtures to Produce Elements to Scale of Armor, of the Expansion Project of the Port of Veracruz, Ver."** May 16 to August 12, 2002, URBYTEC, S.A. DE C.V., 98% complete.

12 **Socio-economic Study of the Fishing Activities in the Marine Area of Bay of Vergara, Ver.**, April 10, 2002 to December 31, 2002. ENVIRONTECH, S.C., completed.

13 **Study of Coastal Hydrodynamics in the Federal Area of Bay of Vergara, Ver.**, April 8 to December 31, 2002, GS Integral Engineering, S.A. de C.V., completed.

14 **Study of Technical Justification to Request Change of Land Use in the Aea of Reduction of the Reservation of the Biosphere of the Tuxtlas in the Town of Balzapote, Veracruz**, August 28 to September 28, 2002. Ingeniero Gastón Rojas Morales, completed.

15 **Study of Impact of the Coast Transport in the New Works of Expansion of the Port of Veracruz and in the Adjacent Coast.** August 21 to November 22, 2002, ALATEC PROES, S.A., completed.

16 **Studies of Basic Characterization and Monitoring of Marine Flora and Fauna in the Bay of Vergara, Ver.**, September 2 to December 20, 2002, Grupo Antón Lizardo, S.A. de C.V., completed.

17 **Office, Supervision of Tests in Hydraulic Models and Realization of Studies of Maneuverability of Ships for the Expansion of the Port of Veracruz**, October 1, 2002 to March 31, 2003, Universidad Veracruzana, 34% complete.

18 **Prefeasibility Study of New Area of Logistic Activities in the Port of Veracruz**, October 14 to November 29, ALATEC PROES, S.A., completed.

19 **Technical Study and Regulatory Impact for the Upgrade of the Polygonal one of the Veracruz National Park Reef System.** October 22, 2002 to June 30, 2003 SIGEA, 75% complete.

20 **Study of Technical, Economic and Financial Feasibility for the Expansion of the Port of Veracruz.** DMJM+HARRIS, INC. underway.

21. **Manifestations of Environmental Impact Regional Modality for the Expansion Works and Development of the Port of Veracruz in the Federal Zone of the Bay of Vergara**, December 2001, ProCoMar, S.A. de C.V.

22. **Master Plan for Development of the Port of Veracruz, 2000-2010 (Modification 2005)**, APIVER, February 2005.