U.S. TRADE AND DEVELOPMENT AGENCY

EXECUTIVE SUMMARY

Clean Petroleum Products Terminal Project in Puerto Ventanas, Chile

September, 2000

U.S. Firm: Frederic R. Harris, Inc.
Main Contact Name: Mr. Brian Stobbie
Current Phone: 212-973-2900
Fax: 212-953-0399
E-Mail: Bstobbie@frharris.com

Project Sponsor: Puerto Ventanas
Main Contact Name: Mr. Alvaro Larenas
Current Phone: 562-638-4199
Fax: 562-638-4252

TDA Activity Number: 99-50046A
NTIS Number: Volume 1 PB2001100835
Volume 2: PB2001100836

Region: Latin America
Country: Chile
Sector: Transportation

SECTION I

EXECUTIVE SUMMARY

1.1 INTRODUCTION

Frederic R. Harris, Inc., (Harris), performed this feasibility study for Puerto Ventanas S.A. The U.S. Trade and Development Agency JDA) provided a grant to partially fund Harris' performance of the study. This feasibility study is to help Puerto Ventanas develop financial and scheduling plans and programs for a Clean Petroleum Products Terminal based on reliable technical recommendations and cost estimates.

This study examines the options for further port development in an effort to expand and modernize the existing facility in the direction of the projected needs of the Chile market. Specifically, the feasibility study examines the market conditions, current and forecasted, for various clean petroleum products including liquid products and Liquefied Petroleum Gas (LPG). Based on the market demand for such commodities, several conceptual schemes were developed for an additional berth, Berth 6 at Puerto Ventanas' pier, for tankers in the range from 45,000 DWT to 150,000 DWT. The feasibility study includes estimates of capital costs and descriptions of the range of sources for financing the recommended development.

Harris, through our local consultant REA Ingenieros, worked closely with Puerto Ventanas management and technical teams. Based on information ascertained for the Puerto Ventanas, Harris and RFA developed an overall project plan and schedule for engineering, design, procurement and construction of the terminal and ancillary facilities, as well as site investigation programs.

Existing Terminal

Puerto Ventanas is located on the West Coast of Chile approximately 160 kilometers north west of Santiago in Quintero Bay. Presently, there are five facilities in Quintero Bay (State Pier, Oxiquim Pier, Gasmar Pier, ENAP Pier, a Single Point Mooring (SPM) and Puerto Ventanas Pier). Three of these facilities already handle liquid petroleum products and two handle LPG. The Puerto Ventanas finger pier presently handles black products such as asphalt, and fuel oil at the Fuel oil and Asphalt Terminal. The Puerto Ventanas Pier also handles dry bulk and other liquid products. The Puerto Ventanas pier has adequate space, and appears to have sufficient structural capacity to provide the essential infrastructure for clean petroleum products and LPG.

1.2 MARKET REVIEW

The Harris team reviewed the potential market demand for the importation of clean petroleum products and LPG, verified the number of clients, quantities, products and other operating requirements of the terminal. The total imports of liquid fuels in 1998, the latest year for which statistics were reported, were:

-	total volume	2,656,265 m3, of which:
-	liquefied gas	959,259 m3,
-	motor gasoline	477,694 m3,
-	jet fuel	267,000 m3,
-	diesel fuel	783,000 m3, and
-	fuel oil	169,312 m3.

The Empresa Nacional de Petr6leo (ENAP) imported 907,3) 80 m3 and distribution companies and direct users imported 1,748,885 in") of liquid fuels.

Besides ENAP, the principal importers of liquid products, other than liquefied gas, were:

- Compahia de Petr6leos de Chile (COPEC),
- Shell Chile S.A. Comercial e Industrial (Shell),
- Petr6leos Transandinos YPF S.A. (YPF),
- Esso Chile Petrolera Ltda. (Esso), and
- Coastal Petroleum N.V. Chile Ltda. (Coastal).

The main importers of liquefied gas were:

- ENAP,
  Gasmar,
- Distribuidora de Gas Enagas S.A. (Enagas),
  Abastible S.A.,
- Gas Licuado Lipigas (Lipigas), and
- Gasco Concepci6n (Gasco),

with ENAP, Gasmar, Abastible and Lipigas being active in the central region of Chile where Puerto Ventanas is situated.

Meetings and telephone discussions were conducted with COPEC, Shell, YPF, Esso, Gasmar, Abastible, and Lipigas, to find out about their activities and potential interest in the proposed facility.

Due to its location, the Metropolitan Region (Santiago) and Region V (Valparaiso) are considered to be represent the primary market for an import terminal at Puerto Ventanas. It was determined that in 1998, 54.9 per cent of gasoline sales were in these two regions, 42.8 per cent of diesel fuel sales, 72.8 per cent of jet fuel sales and 62.8 per cent of liquefied gas sales.

Projections were also developed for middle, high and low scenarios for imports of the clean petroleum products to the Metropolitan Region and Region V, based on growth rates of 4.0 per cent in the middle case, 4.8 per cent in the high case and 3.1 per cent in the lower case.

For the middle case, liquid fuels imports including LPG for the two regions were projected to increase from an estimated 757,000 m3 in year 2000 to 1,999,000 m33 in year 2025, with LPG increasing from 380,000 m3 to 1,004,000 over the same period.

The existing facilities at Las Salinas in Vifia are expected to shut down in October 200 1. There are, however, two existing facilities handling liquid products and two handling LPG in Quintero Bay. The proposed Clean Products Terminal at Puerto Ventanas could potentially offer some competitive advantages by being able to accommodate larger ships, offer favorable tariffs and service conditions and by being operated by a terminal company not involved in product supply and marketing. Based on this, the terminal could potentially capture a 30 to 50 percent market share.

Development of link ups to the main liquid products and LPG pipelines to the distribution plant at Maipu, near Santiago, would have a major impact on the competitiveness of the proposed clean products terminal at Ventanas. A meeting was conducted with Sonacol, Chile's domestic oil and products pipeline operator. Pipelines handled an estimated 78 % of liquid products and 58 % of LPG sold in the Metropolitan Region in 1998.

The risks for the terminal include, in addition to the competition from nearby tenninals, the potential for

To facilitate the unloading of LPG, the manifold of LPG tankers need to be connected to the

increased domestic refining in lieu of imports, or construction by others of a trans-Andes products line beside the natural gas line completed recently. Conversely, the proposed terminal would greatly reduce the exposure of potential clients to limited competition after closure of Las Salinas, and the risks of shortages in the event of downtime at competing facilities.

1.3 ENGINEERING EVALUATIONS

The engineering evaluations are based on available data from existing oceanographic, coastal, geotechnical and structural investigations and reports, a cursory review of the existing facilities, and local Quintero Bay Maritime Authority regulations.

The developed design criteria form the basis for the design and construction of the Clean Petroleum Products Marine Terminal in Puerto Ventanas. The design criteria incorporated the safety requirements for tankers operating in Quintero Bay in general and at Puerto Ventanas in particular.

Design will adhere to Chilean National Standards (Normas Nacionales - NCh) and International Standards and Codes for reception facilities of petroleum products and gas tankers.
The tanker approach and docking operations have wave and wind velocity limits that are established and controlled by the Quintero Bay Maritime Authority. The Authority does not restrict the departures or mooring of individual vessels, however the Authority does approve, based on prior study, the conditions for vessel approach and maneuvering plans. Such restrictions or limits were established by this study to assure operational safety for the tankers, the port and to safeguard the environment. These limits for berthing and mooring of the vessels, established in the design criteria, would be exceeded about 25 - 40 days a year, due to local atmospheric and/or oceanographic conditions.

Several conceptual layouts or schemes for development of Berth 6 are presented in Section 6 of this report. Access from the shore to Berth 6 is provided by use of the present pier and, beyond the existing pier by a pile supported pipeline trestle and walkway between the existing Berth 5 and Berth 6. All schemes include the construction of the unloading platform, including the associated valves, control room, fire monitors, pile supported pipeline trestle and walkway between Berth 5 and Berth 6, and auxiliary facilities. In the schemes that are considered unsafe or risky for handling LPG, the LPG piping and equipment were omitted in the cost estimates. Harris considered for safety reasons, LPG should not be handled in these schemes. If the cost of LPG piping were included with every scheme, then overall cost differences between them would be very small, The recommended layout, Scheme 1, is shown in Figure I -I and described below.

Scheme 1. This scheme is recommended for implementation at Berth 6 in Puerto Ventanas and is intended to serve both clean petroleum product imports and LPG imports.

Scheme I consists of a conventional tanker berth with four breasting dolphins, two new forward mooring dolphins, and interconnecting walkways. Three existing, aft mooring dolphins would be adapted for combined service for Berth 5 and Berth 6.

One 12" diameter LPG loading arm (16" pipeline) with 4" diameter piggyback recirculating connection and two 10" diameter loading arms (14" pipelines) for white products are included in this scheme.

Advantages of this scheme are as follows:

This scheme is the safest for handling LPG and clean petroleum products.

It is also the most efficient, requiring less time for connection and safe disconnection of the tanker.

It requires less maintenance, which could be conducted in the periods between deliveries. Thus, the terminal is out of service fewer days.

It requires storing fewer spare and replacement parts for normal operation.

Considering capital cost and operating costs, this scheme is the most economical.

Piping System

The piping analyzed in this study is based on the maximum economy of the initial capital investment. It consists of two 14" pipelines for clean petroleum products and one 16" LPG product pipeline and 6" LPG recirculation pipeline. The service piping Tank Farm for slops, fire water and other utilities could be brought from Berth 5.

The available Lot B, east of Quintero-Puchuncavi Road (Ruta F 30 E) is adequate for development of a tank farm for all products to be handled in the terminal, and to provide a distribution center for tank truck loading, service and sales operations.

Additional lots which might be available were not reviewed. Since the Lot B area is able to accommodate the forecasted demand. Additional lots could be considered for other requirements in the future.

The tank farm could be developed by clients or others, and its cost is not included in this report. The conceptual layout of the tank farm is shown in Figure 6-4.

1.4 ESTIMATED PROJECT COSTS AND SCHEDULE OF DEVELOPMENT

Project Costs

The estimated project costs including design, construction, taxes, duties, etc., of the various schemes are shown in Section 6. Scheme 1, the recommended layout, project cost is approximately US $21.6 million dollars (year 2000 dollars).

Project Schedule

The development of the project could be conducted on the conventional design-bid-build (DBB) basis or on the accelerated basis: 30% design followed by the turnkey bid-design-build (BDB) contract. The conceptual Schedule, Figure 1-2, reflects the conventional DBB project development.

1.5 UP-TO-DATE STUDIES AND PLANNED INVESTIGATIONS

A borings and soil investigations would be required at the locations of the specific structures. The soil investigation program, described in Section 4, would be developed at the start of the preliminary design of Berth 6.

Additionally, a current comprehensive underwater re-inspection of the pier, as outlined in Section 4, is required.

1.6 ENVIRONMENTAL IMPACT, MONITORING AND CONTINGENCIES

The project design and operation would adhere to Chile National environmental laws and to the applicable international environmental conventions. The monitoring and environmental control of the operations are discussed in Section 7.