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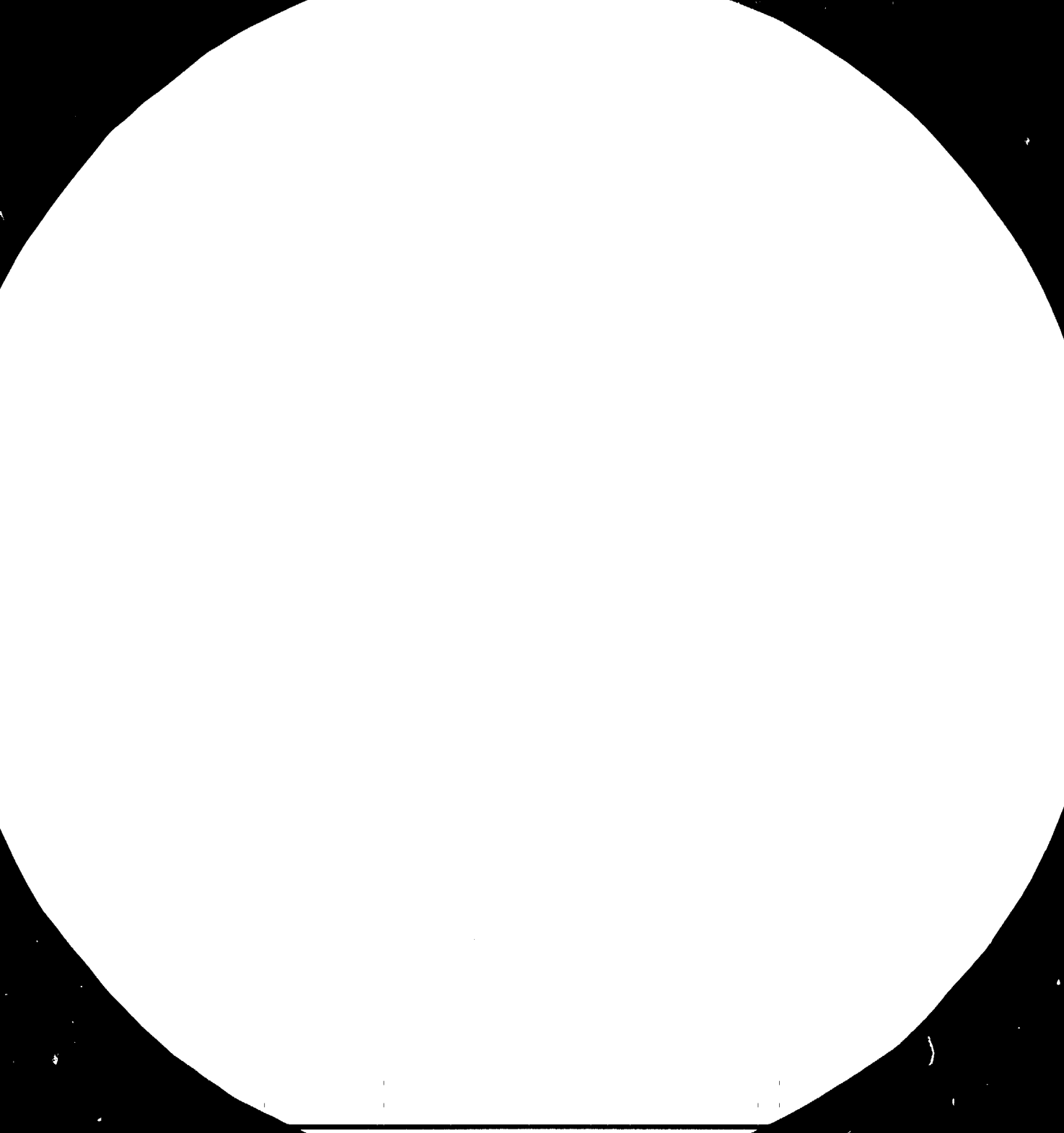
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REPORT TO
UNITED NATIONS FOR INDUSTRIAL DEVELOPMENT ORGANIZATION
UNIDO

JOINT-VENTURES IN THE PETROCHEMICAL INDUSTRY.

CASE SURVEY - LATIN AMERICA

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JULY, 1984.

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FOREWORD

UNIDO is conducting a series of field studies regarding the factors influencing the development of petrochemical industry in developing countries and regions.

The findings of the studies will be presented during the 3rd Consulting Meeting on Petrochemical Industry to be held during 1985.

One of these studies concerns the evaluation of the importance of the joint-ventures as instruments for the management of petrochemical projects, the operation of petrochemical plants and the commercialization of their products, as well as their usefulness as strategic tools for the consolidation of the petrochemical activity in developing countries.

In view of the relative importance already attained by the petrochemical production in several countries within Latin America, this region was selected by UNIDO to conduct such a field study.

Between March and May, 1984 the consultant interviewed executives representing 34 corporations and organizations from five Latin American countries, which are the most representative cases of petrochemical joint-ventures in the Region. Annex A contains the list of organizations surveyed and this report presents the main findings.

INTRODUCTION

Significant consumption of petrochemical products started in Latin America during the decade of the Fifties and early Sixties, but the decision to produce petrochemicals at a national scale was taken by several Latin American countries by the mid-Sixties.

The fact that oil production and refining was the responsibility of government-controlled oil companies in most countries in Latin America at that time, helped the establishment of petrochemical development programs at national levels in several countries, and preconditioned the type of structure to be given to the proposed petrochemical industry, which in most cases relayed in the joint-venture approach.

At the same time, efforts were initiated by the government of Latin American countries, to establish regional co-operation arrangements, which also contributed to the need of defining national or even sub-regional terms of references, to orient the establishment of petrochemical production activities within the Region. The Latin American Free Trade Association (now Latin American Integration Association) and the Andean Group Pact are good examples of these regional co-operation efforts, which have influenced the establishment, characteristics and performance of the petrochemical industry in Latin America, as it will be discussed later in the report.

The need of a better knowledge of the present petrochemical activities and future growth within the Region, as well as the need of information on the main factors influencing its future at a regional basis, i.e.: available markets, technological trends, governmental regulations, engineering capabilities, etc., have contributed to the creation about four years ago, of the Latin American Petrochemical Associa-

tion (APLA), which is the meeting place, discussion forum and information source for the Latin American petrochemical industry.

These three factors:

- . The active governmental participation in the establishment of petrochemical industries.
- . The regional and subregional co-operation arrangements.
- . The positive interest of the Latin American petrochemical executives in working jointly in the solution of common problems,

have influenced and continue to influence the performance of the petrochemical industry in the Region and are reflecting in the results obtained and expectations of most of the petrochemical executives interviewed for this study.

CONCLUSIONS AND RECOMMENDATIONS

The in-depth analysis of a representative sample of petrochemical joint-ventures, operating in the Latin American scene, most of them, since the mid-Sixties or early Seventies, allows the drawing of some general conclusions as to their role and usefulness in the developing of petrochemical industries in developing countries.

There is no question that the joint-venture mode of constituting companies to develop, build and operate petrochemical plants has demonstrated its usefulness in consolidating the petrochemical activity in developing countries.

Certain basic conditions appear to be necessary to reach that objective, among them:

- . A clear understanding on the purpose, long-term goals, and operating strategies of the joint-venture by all parties involved. This understanding can be reached when all partners have a similar degree of awareness of all the implications, technical and otherwise, of a petrochemical activity in a developing country.
- . Once the understanding exists, it is of lesser importance if the joint-venture is to be formed by government corporations and foreign technology investors; by private local investors together with foreign technology companies or any combination therefrom.
- . A key concept in forming a joint-venture is flexibility, and within this concept, a pragmatic approach towards the formation of tripartite joint-ventures, as developed for the Brazilian petrochemical industry, may prove to be useful under changeable circumstances.

- . The administration of the joint-venture by local partners' representatives has proved to be useful, as long as the local partner, either government or private, have already developed his own capability as administrator. If that is not the case, the administration of the joint-venture can be assigned to the foreign partner, perhaps under a fixed-term contract.

- . Outside of the transferring of the needed production technology, (which can be also subject to a straightforward purchase), the key element provided by the presence of a foreign technology partner in a joint-venture, is a permanent link to technology improvements, inside technical information and efficient troubleshooting services. Normally these on-going services are obtained through separate technical assistance contracts, between the joint-venture and the foreign technology partner.

If these services are poor or non-existent, then the reason of a foreign technology partner having a share in the joint-venture equity, is difficult to justify, moreover if the foreign partner is not willing to accompany the joint-venture in new developments or in diversification programs.

To foresee and avoid this type of potential problems, it is important for the local partners to select the foreign technology partner not only in view of the merits of the production technology he may bring into the joint-venture, but also on his philosophy and policies, regarding a long-term collaboration, with the local partners.

- . On the other hand, an international chemical company, either being one of the multinationals or a technologically specialized medium-sized one (which by the way, have already started

to appear in Latin America), expect from local partners a similar view in business approach, long-term goals, marketing strategies and the like.

- . The government role in developing countries is of capital importance to the success or failure of petrochemical joint-ventures, due to the industry inherent inflexibility in front of drastic changes in the macroeconomical milieu. Therefore, well defined ground-rules and permanence in time of those ground-rules, including a certain degree of flexibility and adaptation to macroeconomical changes, are basic preconditions to the economic survival of petrochemical joint-ventures in developing countries.
- . It has always facilitated the action of petrochemical joint-ventures in developing countries, the local availability of key basic raw materials: ethylene, propylene, aromatics, etc., produced by a non-conflicting source such as a national oil company or a national petrochemical company created for that purpose and also to represent the government's interests in down-stream joint-ventures. If the national petrochemical company is created with high level of professionalism and freedom of political interference, that will be the greatest asset to the joint-ventures where it may participate.
- . The marketing of the petrochemical produced by a given joint-venture, within or outside the developing country where it operates, normally will rest as a specific responsibility of the producing joint-venture. During the initial export period either governmental trading organizations or the foreign partner international trading channels, may be of help. More important even, are the actions taken at governmental level,

to secure a more permanent access to export markets, such as the ALALC-ALADI market preferential arrangements or the ANCOM common market approach, developed within Latin America.

- . Opportune and updated information on market trends, technological breakthroughs and world macroeconomical monitoring, is a key decision tool for both governmental authorities and local entrepreneurs, which want to enter petrochemical production through joint-venture approach in an ever-changing world.

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ARGENTINA

General Background.-

Argentina has a total population in the order of 28,5 million, with a literacy rate over 90%, a per capita Gross Domestic Product of US\$ 1.666 (1982), a positive trade balance of over US\$ 3 billion per year and an accumulated external debt over US\$ 40 billion.

Since the mid-Fifties, Argentina has been exposed to frequent and quite different political systems, mostly military in nature, which has not provided a continuity in economical policies and, therefore, has curtailed the industrial development of the country.

These economic changes have been more pronounced during the last decade, when economic policies have moved from a well defined nationalistic and protective economy, with substantial government participation in the contribution to the GNP of the country, to a monetaristic policy based on free trade and prices, with minimum governmental participation in the allocation of resources and with the use of an open and free market as the main economic force.

This scheme was suddenly interrupted in 1982 due to Argentina's brief but costly involvement in a South Atlantic armed conflict with the United Kingdom, where a diplomatic solution is still unresolved.

Since late 1983, Argentina has a democratically elected new government, which has not yet defined the main guidelines to be applied for the industrial development, due to more urgent matters such as the renegotiation of the external debt and the diplomatic solutions to its international conflicts.

Under these political circumstances it has been very difficult to the Argentine petrochemical entrepreneurs, either from private or the public sector, to carry out important new ventures in the petrochemical sector, in spite of the availability of substantial hydrocarbon resources in the country and a fairly well developed domestic market.

These factors have reflected in a slow, fragmented and un-completed petrochemical development, initiated during the Sixties partly by foreign investment, partly by governmental enterprises and partly by private Argentine entrepreneurs, in fairly disconnected efforts. The country is still lacking a national petrochemical master plan, with well defined rules of the game.

As a result, the joint-ventures established in Argentine to carry out new ventures in the petrochemical are quite varied in nature as well as in purpose and results, as it will be analyzed below.

The petrochemical joint-ventures selected in Argentina are:

- . Atanor SAM, a joint-venture majority of individual private Argentine investors and a minority of government participation.
- . Petroquímica Río Tercero, a joint-venture of Atanor with two government corporations.
- . PASA - Petroquímica Argentina, a joint-venture between five American companies.
- . Petroquímica General Mosconi SAIC, a joint-venture between two government corporations.
- . Petroquímica Bahía Blanca S.A., a joint-venture between three government corporations and six private corporations.

The key participant in all joint-ventures with Argentine government presence is Dirección General de Fabricaciones Militares (DGFM), the industrial branch of the Argentine Army.

It would be very difficult to forecast the future of the already established petrochemical ventures in Argentina or to foresee the type of new developments in the near future, since the new elected government of the country has yet to define the main parameters for the development of this industrial sector.

In any case, the government has already indicated that the petrochemical industry will have a high priority in the industrial development plans of the country.

Company Profiles, Motivations and Objectives

1.- Company: ATANOR, Sociedad Anónima Mixta
Lavalle 348, Piso 3°
(1306) Buenos Aires, Argentina
Tels: 3118141/45
TELEX: 21386 ATSAM

Contacts: Dr. Juan Martin Moore
Executive Vice President
Ing. Jorge Gaibisso
Development Director

Atanor was established in 1938 by private Argentine investors with the purpose of manufacturing some chemical intermediaries for the Argentine industrial market. During 1944 Dirección General de Fabricaciones Militares (DGFM) took one third of ATANOR's capital, with the main purpose of developing a synthetic rubber plant, a project which

never materialized due to the increased world-wide availability of all types of rubbers at the end of WW II.

During 1962 ATANOR experienced an expansion of several of its production activities which required additional fresh capital, motivating the entry of the Dow Chemical Co. of U.S.A., solely as an equity investor (17%). No technological neither management involvements were expected from Dow, who finally was bought out of the company in 1972 and Atanor's ownership established as it is today:

80% private Argentine investors (individual and corporate)
20% DGFM

During a period of time during the Sixties, Atanor participated in a 50-50 joint-venture with Hooker Corp., called Duranor, in order to produce phenol. When Hooker was bought by Occidental Petroleum in the States, new development plans were visualized for Duranor by Occidental, but Atanor declined to accompany the new projects and finally withdrew from Duranor. Later changes in the economic policies of the country killed the projects and Occidental withdrew from the chemical activities in the country.

Early in the Seventies, based in new national petrochemical ground rules, Atanor initiated a new joint-venture to produce TDI, which finally came into fruition and is analyzed separately in detail.

During 1983, Atanor manufactured a great variety of industrial chemicals, agricultural chemical products and household chemical products, with a total sales value of about US\$ 55 million, of which US\$ 6 millions (particularly as ethyl acetate and some herbicides) were exported to industrialized countries in North America and Europe.

Atanor owns two manufacturing centers: one in Munro, close to

Buenos Aires and a second one in Río Tercero, in the Province of Córdoba, where DGFM has developed an important industrial center.

2.- Company: Petroquímica Río Tercero S.A.
Avda. Córdoba 1357
(1372) Buenos Aires, Argentina
Tels: 416033/417545
TELEX: 18209 PR III

Contact: Ing. Jorge Gaibisso
Executive Director

Petroquímica Río Tercero (PRIII) was established as a joint-venture by Atanor during 1973 with the purpose of manufacturing toluene di-isocyanate (TDI). Engineering and construction contracts were assigned in 1976, and production started in 1981.

TDI capacity is 16,000 MT/year, together with a chlorine capacity of 12,000 MT/year, in order to supply this important raw material to the TDI plant.

This production complex is installed in Río Tercero, Province of Córdoba, where DGFM and Atanor have production facilities.

PR III ownership is as follows:

Atanor	:	51%
YPF	:	38%
DGFM	:	11%

YPF stands for Yacimientos Petrolíferos Fiscales, the Argentine state oil company, which together with DGFM is involved in several other petrochemical joint-ventures as it will be discussed later.

Total investment in the TDI and related plants was around US\$ 100 millions and the process used was originally from Du Pont.

Main external raw materials utilized are:

- . Toluene, supplied by Petroquímica General Mosconi (see below)
- . Nitric and sulphuric acids, supplied by DGFM.

Coproducts hydrochloric acid and caustic soda are distributed within Argentina by parent company Atanor.

Main product TDI was produced during 1983 at a rate of 12,000 MT/year of which 5,000 MT were sold within Argentina directly by PR III and 7,000 MT were exported: half of it to other Latin American countries (Chile, Perú, Uruguay and Colombia) and the other half to Western Europe, U.S.A. and Canada.

No new investments are contemplated for the rest of the decade.

3.- Company: Petroquímica General Mosconi S.A.I. y C.
Perú 103
(1067) Buenos Aires, Argentina
Tels: 33-5964/ 33-6358 / 33-6422
TELEX: 22850 PEMOS AR

Contacts: Dr. Luis Alberto García
Director (representing DGFM)
Dr. Héctor Cambiaggio
Assistant to the President
Ing. Juan Carlos Tagliabue
Manager, Planning and Development

Mosconi was created in 1970 by two Argentine government organizations, each with 50% participation:

Dirección General de Fabricaciones Militares (DGFM) : 50%
Yacimientos Petrolíferos Fiscales (YPF) : 50%

The purpose of Mosconi was the establishment, in Ensenada, close to La Plata, Buenos Aires Province, of an aromatic petrochemical complex, in order to allow the development of the downstream intermediates, since a market for the end-products already existed in the country (synthetic fibers, polystyrenes, synthetic resins, etc.).

Mosconi commissioned the production units of its aromatics complex in 1974, with the following installed capacities:

Benzene	:	120,000 MT/year
Cyclohexane	:	45,000 MT/year
Toluene	:	75,000 MT/year
o-Xylene	:	25,000 MT/year
p-Xylene	:	40,000 MT/year
Mixed xylenes	:	20,000 MT/year

Benzene is partly used within Mosconi to produce the cyclohexane and a certain amount of toluene is hydrodealkylated into benzene by Mosconi, according to the market needs.

In 1978 benzene capacity was expanded to 140,000 MT/year and again in 1982, until reaching present production capacity of 157,000 MT/year.

Toluene production capacity was also expanded to 92,000 MT/year during 1978.

Since almost none of the expected downstream facilities have materialized since the start-up of Petroquímica General Mosconi, 60% of total physical production was exported in 1983, mostly to consumers in developed countries, representing about US\$ 60 million of the total US\$ 120 million value of total revenue during that year.

Exports corresponded to total cyclohexane and total p-xylene produced during 1983, as well as over 50% of the benzene produced during the same year. Quantities exported were approximately the following:

Benzene	:	70,000 MT
Cyclohexane	:	30,000 MT
p-Xylene	:	27 000 MT

The only important sale within Latin America corresponds to 7,900 MT of p-xylene exported to Brazil through a bilateral agreement established under the Latin American Integration Association (ALADI) arrangements. More of this will be discussed later.

The main raw material utilized by Mosconi is naphta, supplied by a nearly YPF oil refinery.

4.- Company : Petroquímica Bahía Blanca S.A.I. y C.
25 de Mayo 277, Piso 6°
(1002) Buenos Aires, Argentina
Tels: 337758 /337225 /337892
TELEX: 21459 PETBA AR

Contact : Dr. Luis Alberto García
Director (representing DGFM)

Bahía Blanca ethylene petrochemical complex was initially conceived by the Dow Chemical Co. of the U.S.A., as the first important integrated complex based on natural gas to be developed in Argentina. This scheme was proposed to the Argentine government during the late Sixties.

The project received a great deal of opposition from the small ethylene-based petrochemical producers already in operation at that time in the country, which finally forced Dow to withdraw from the project and the Argentine government took the responsibility to continue with this important initiative, through three governmental organizations:

Gas del Estado, the natural gas distributing company.

YPF , the gas and oil producing company.

DGFM , the industrial branch of the Argentine Army.

These three organizations took the responsibility of installing the core units of the petrochemical complex based on ethane from natural gas, in Bahía Blanca, in the Southern tip of the Buenos Aires Province. Simultaneously, the Argentine government, promoted the installation of the planned downstream plants, where the majority of the equity capital has to be provided by private capital, the government keeping a 30% in each of the joint-ventures to be formed, through DGFM participation, as was defined by the petrochemical ground rules established early in the 70's when the complex was in the planning stage.

As a result of these concurrent efforts, the Bahía Blanca petrochemical complex will be integrated by the following plants:

Plant	Owner	Production capacity (MT/year)	End-construction (year)
Ethane separation	Gas del Estado	n.a.	1981
Ethylene	Petroquímica Bahía Blanca	200,000	1976
LDPE	Polisur S.M.	70,000	1982
Linear LDPE	Polisur S.M.	120,000	1982
HDPE	Petropol S.M.	32,00	1986 (est.)
VCM	Monómeros Vinílicos S.M.	130,000	1986 (est.)
PVC	Indupa S.A.	58,000	1986 (est.)
PVC	Electroclor S.A.	45,000	1986 (est.)

Indupa and Electroclor are private companies; Polisur, Petropol and Monómeros Vinílicos are joint-ventures, where the Argentine government, through DGFM, participates in a minority way (30% in each of them) and Petroquímica Bahía Blanca has the following ownership:

Gas del Estado	17%	} 51%
Yacimientos Petrolíferos Fiscales (YPF)	17%	
DGFM	17%	
IPAKO ^{1/}	21%	} 49%
Electroclor	11%	
Indupa	5%	
C. Itoh	9%	
Cidasa	2%	
Isaura	1%	
	<hr/> 100%	

^{1/} IPAKO S.A. is a private Argentine chemical company and the main shareholder in Polisur S.M., the most important LDPE producer of the country.

The ethylene plant of Petroquímica Bahía Blanca was originally conceived for 120,000 MT/year production capacity, but before it was commissioned in 1976 it was expanded to the present 200,000 MT/year production capacity and serious thoughts are being given to a further expansion to 300,000 MT/year before the end of the decade in view of the expanded ethylene demand particularly due to the non-accounted for lineal low density polyethylene project developed by IPAKO on behalf of Polisur.

It is very difficult to calculate total investment required by the ethylene plant in view it was commissioned in 1976, then mothballed until 1982, when it has both the ethane raw material from Gas del Estado and some down-stream plants to take care of the ethylene produced.

During 1983 Petroquímica Bahía Blanca produced about 180,000 MT of ethylene, of which 35,000 MT were exported, mostly to Western Europe.

5.- Company: PASA - Petroquímica Argentina S.A.
Suipacha 1111, Piso 11°
(1368) Buenos Aires, Argentina
Tels: 311.6081/6
TELEX: 22130 PASA AR

Contact: Dr. Horacio Rodríguez Larreta
Director, External Affairs

PASA was established in 1960, as a private Argentine initiative, to develop the manufacture of synthetic rubbers and the necessary raw materials, based on the expected development of the Argentine market.

Eventually this initiative was materialized through the participation of an American entrepreneur: Fish Engineering and four other American chemical companies, establishing the following ownership which is still valid today:

Continental Oil Company	25%
Cities Service Company	25%
Uniroyal Inc.	25%
Witco Chemical Corp.	13.5%
Fish Inter American Inc.	11.5%

The PASA petrochemical complex was commissioned during 1965 - 1966 in the San Lorenzo, Province of Santa Fe industrial site, close to YPF San Lorenzo oil refinery, which provides the main raw materials required by PASA petrochemical complex: naphta, propane and butane.

The initial production plants in PASA's industrial complex were:

Ethylene	:	23,000 MT/year
Benzene	:	58,000 MT/year
Styrene	:	54,000 MT/year
Butadiene	:	37,000 MT/year
SB - Rubber (suspension):		50,000 MT/year

Later on, in 1975 a 2,000 MT/year nitrile rubber plant was added to PASA's production facilities.

An expansion of the styrene production plant capacity to 75,000 MT/year is planned for late 1985 and this will be the only new addition visualized for the rest of the decade.

Production of the main commercial product SB-Rubber during 1983 was about 45,000 MT. of which about 25,000 MT were sold domestically and the balance was exported.

Including the sale of other by-products within the country such as alkylates, aromatic fractions and styrene, total sales revenue reached about US\$ 130 million.

Exports of SB-Rubber went mostly to Colombia, Perú and Venezuela in Latin America and the balance of the U.S. and West Germany.

Latin America exports were obtained almost since the beginning of PASA's operations, thanks to Argentine's active participation in the Latin American Free Trade Association (ALALC) which provides an import duty preferential margin in most of the participant countries for the synthetic rubber produced in Argentine.

This preferential market is presently also utilized by the SB-Rubber producer in Brazil, under the same negotiation scheme.

Critical Comparative Analysis of the Joint-Venture Elements

In the case of Argentina it would be difficult to find common traits in the different joint-venture projects analyzed, due to their different nature, the separation in time and, particularly, the continual changes in the political and economical environment where the projects were inmersed.

Just to point out some examples: The PASA sythetic rubber project, being the first of its kind and importance to be materialized in the country received a lot of specific incentives from the Argentine government of that time, regarding tax incentives (income tax exemption for a certain period of time), exemption of import duties on machinery and equipment needed to build the different plants and, of particular importance, a substantial tariff protection against imported rubbers both synthetic and natural.

On the other hand, besides a preferential access to the hydrocarbon raw materials to be supplied at the complex site by YPF, PASA had to produce all basic petrochemicals required for the synthesis of the SB-Rubber: ethylene, benzene, ethylbenzene, styrene, butadiene, in such a scale as to supply mostly its captive requirements. As a result, initial production cost were very high, hence the need of a high tariff protection for the rubber.

Presently, the new petrochemical projects can rely on available basic raw materials such as ethylene produced by Petroquímica Bahía Blanca or benzene produced by Petroquímica General Mosconi, which are supplied to domestic users at international competitive prices.

PASA is also characterized by the fact that each one of the five foreign owners is a medium size American corporation and their participation is roughly similar in importance as regards the orientation and the management of the Argentine operation. Therefore the day-to-day operation is very much delegated in the highly capable professional Argentine management team who, in practice, run the company.

A similar situation is the case of Atanor, where the actual management is completely in the hands of professional managers, with a long history of permanence in the company.

On the other hand, those joint-ventures where government corporations have an important participation (particularly those where DGFM is the governmental branch involved), the top management has been appointed by them and are responsible to them. In these cases a change in government has some time or another implied a change in top management as well as in the orientation of the company.

Another common trait of all the joint-ventures investigated, outside of the fairly degree of independence of the professional managers

in the way to run the companies, is the degree of independence vis-à-vis the suppliers of the technologies utilized in the materialization and operation of the petrochemical plants. In most cases the technology transfer has been obtained through a straight purchase of the license, without further ties with the basic technology supplier.

There is the case of Petroquímica Río Tercero, where the original technology for the manufacturing of TDI came from Du Pont, but the process was bought from the French licensor of Du Pont technology in view of the attractive financial package offered by French banks with the backing of the French government.

Total investment in the TDI complex, including a caustic-chlorine plant, a dinitrotoluene plant, as hydrogenation unit, a phosgene synthesis plant and the TDI synthesis plant, was about US\$ 100 million, and the time required between the assignation of the engineering contracts and the commissioning of the whole complex was five years (1976 - 1981).

PR III was organized by Atanor in 1973, inviting as minority partners two government organizations YPF and DGFM, which provided the main raw materials and the industrial infrastructure required by the project. PR III organized the project management team drawing expertise already developed in the parent companies, particularly in ATANOR.

This is also a common trait of other Argentine petrochemical joint-ventures analyzed, such as Mosconi and Bahía Blanca, where the parent companies (YPF and DGFM) allocated trained professionals to act quite independently and with a wide degree of flexibility, as project managers for the new joint-venture projects.

Coming back to the TDI project, once the technology search was concluded (with the selection of the Du Pont TDI technology through the French licensor), an engineering joint-venture between the French technology supplier and an Argentine engineering firm, was organized to handle the detailed engineering, equipment procurement and plant construction. Typical of similar projects in Argentina, local procurement and investment represented about 60% of total capital costs and foreign component, accounting for the remaining 40%, was represented by equipment and materials purchased abroad plus a lump sum paid for the technology license as well as the engineering services provided by the French company.

This foreign component was financed by a long-term loan (8 years for repayment, plus a 3-year grace period; 8% annual interest) provided by a syndicate of French banks with guaranties from both the French government and the Argentine government through the National Development Bank, which also provided some local long-term financing for domestic procurement.

Equity was initially provided by the three founding partners: Atanor, YPF and DGFM. In the case of Atanor, being a predominantly private concern, it received the incentive of deferring a portion of income tax payments in order to allocate it as equity in the new joint-venture.

Later on, private shareholders were admitted into the company with non-voting rights. They presently represent 70% of the joint-venture equity and their shares have preferential rights regarding dividend distributions.

The new joint-venture (PR III) obtained the following tax incentives:

- . No import duty on imported equipment not manufactured in the country.
- . Deferement of future income tax, for a period of time after start-up.

On the other hand, no increase of existing import duty on TDI was requested or allocated, since the 38% ad-valorem duty was considered protection enough for the new production.

This situation was repetitious with the other Argentine joint-ventures analyzed, particularly in the case of basic petrochemicals such as ethylene or benzene, where domestic sale prices are very similar to international prices and no protective import duty is utilized, even if it may exist.

The engineering contracts signed between PR III and the French-Argentine engineering consortium was a standard one of the turn-key type, excepting only the procurement of Argentine equipment, due to the influence of inflation in their prices.

The Petroquímica General Mosconi aromatics complex project was managed in very similar lines. A project management team was organized very early in the start-up of the project, drawing expertise from both partners: YPF and DGF. A general contractor was assigned, with engineering offices in both the U.S. and Argentina, since the basic engineering package was provided by three American companies: ARCO, Engelhard and Hydrocarbon Research.

Of the total investment of about US\$ 70 million, 30% was foreign component and 70% local investment in equipment and services. The foreign component was financed through long-term credits given by the Ex-Import Bank and private U.S. banks. The local component was

financed by the equity money placed by the two partners DGFM and YPF and by a local long-term credit given by the National Development Bank of Argentina (an official financing institution). The final financial package resulted in a 75/25 loan-vs-equity distribution.

The operation of the joint-venture companies analyzed have all a common denominator that its main goal is to generate enough profit to repay the outstanding debts and to provide the shareholders, irrespective if they are private single investors or government corporations, with a fair return on the money invested.

Being Argentina a fairly small market compared with, for example that of Brazil or Mexico, in most cases one plant per product is sufficient to supply the domestic market and even have excess capacity for export, therefore there is very seldom competition for a share of the domestic market and Argentina's tariff structure has been in most cases sufficient protection against imports.

Besides and due to ample supply of domestically provided hydrocarbons as raw materials for the development of the petrochemical industry in the country, the different Argentine governments have always provided for a preferential supply of basic feedstocks (naphta, natural gas, LPG, etc.) to the Argentine petrochemical industry, at prices generally below those prevailing in the international fuel markets. This factor has been perhaps the key reason of the adequate performance of most of the joint-venture operations analyzed, together with the consistently high capabilities of the professional managers running them.

The technical capabilities of the local engineering teams responsible for the design and operation of the different petrochemical plants have been demonstrated by smooth plant operation and in many

cases, by running some of them over the designed production capacity levels. In the few instances of some serious production problems, it has been always possible to bring in trouble-shooting personnel from the corresponding technology licensor, to solve "in-situ", the operation problem.

Other aspects related with trouble-free operations of the petrochemical plants in Argentina, such as personnel training and the establishment of safety standards and procedures, are handled directly by each joint-venture, utilizing in most cases Argentine specialized institutions for advanced operations training and safety norms and regulations. A good example of this type of organization is the PIDCOP operation in the petrochemical complex at Bahía Blanca, helped by a UNIDO technical co-operation project.

As regards to workers' participation in management decisions, this is not a normal practice in the Argentine petrochemical industry neither in the rest of the countries included in the study, irrespective if the ownership is government-controlled or private-controlled. Neither performance incentives are common practice.

In all joint-ventured analyzed in Argentina, final management decisions rests in a Board of Directors, with representation in proportion to the shares owned by the different partners.

As a general rule the president or managing director of the joint-venture is the chief executive officer, (CEO), empowered in order to run the company as well as to take the day-to-day decisions. His nomination, normally done as a proposal of the biggest shareholder, has to be ratified by the consensus of the Board. In a few cases, the Board delegates some of its power to an Executive Committee, to help the CEO in more contingent or specialized matters.

What proved to be a useful tool, was the creation of an ad-hoc Technical Committee, formed by experienced professionals from the parent companies, to help the Project Manager during the materialization of the first petrochemical project by the new joint-venture.

Being the Argentine economy subjected to high inflation rates during the last 20 years, when most of the petrochemical plants under study have been operating, it will be completely irrelevant to refer to costs and prices. Even the supply of the main raw materials has not been subject to contracts, but prices are being negotiated among the parties involved every three months or so.

The main reference point, as it was indicated before, has been the preferred transfer prices of the main hydrocarbon petrochemical raw materials (naphta, natural gas, propane, butane, etc.) to the Argentine petrochemical production system, normally 30% below their prevailing value as fuels.

These prices are transferred down the production chain to the final end-user. According to the prevailing exchange rate policies of the Argentine monetary authorities at a given time span, these internal prices have placed the Argentine industry in more or less competitive situation, with foreign production. For example, during the second half of the Seventies, when an open market, controlled exchange rate monetary system was applied, Argentine petrochemical industry was heavily impacted by international competitive production and profit margins showed the results.

Presently with a more realistic exchange rate of the Argentine peso vis-a-vis the main international trade currencies, Argentina is competitive again in the international petrochemical markets and obviously, in the domestic market. This is a very good example on how, in an inflation ridden economy, government decisions on exchange

rate policies, have a very strong influence in the overall performance of a given industrial sector, in this case, the petrochemical industry. This analysis will be expanded when other Latin American petrochemical joint-ventures will be studied.

As a general rule, the domestic marketing of the main petrochemical production is done by the joint-venture companies themselves, through their own sales organizations. A few exceptions are some commodity co-products, such as caustic soda and hydrochloric acid co-produced in the TDI complex, where PR III gives their distribution to the present company Atanor, or the fuel by-products generated by the aromatics production and recovery by PASA and Petroquímica General Mosconi, which are returned to the corresponding YPF refineries, for further processing and marketing by the state oil company.

Technical sales support as provided mostly for those products which are more specialized and complex in their application, i.e., SB-Rubbers by PASA and TDI by PR III. Particularly in the case of TDI applications which must be formulated by the end-users with polyols manufactured in Argentina by a different company, in order to produce a great variety of polyurethane foams and compounds, PR III has to install an applications laboratory to work together with the polyol manufacturer, in order to develop the right type of formulation for each application and then, disseminate the results to the TDI clients through technical bulletins and "in-situ" technical assistance.

For the sale of petrochemical commodities such as aromatics or olefins, this technical assistance is normally not necessary, but only a close monitoring of the technical specifications of the commodities sold.

To penetrate the foreign markets different strategies and channels have been pursued.

In the case of other Latin American markets, the Argentine petrochemical producers have looked for local representatives to handle their business in each of the countries. More and more these representatives tend to be local chemical industries with concurrent interests. The reason behind this trend is a better utilization of the industrial negotiation power in order to obtain mutual tariff benefits, within the ALALC (presently ALADI), Latin American Integration Association.

In a nutshell, ALADI is a regional free-trade system approved by the governments of 11 Latin American countries (Argentina, Brazil, Mexico, Chile, Uruguay, Paraguay and the five Andean Pact countries: Bolivia, Colombia, Ecuador, Peru and Venezuela).

Within ALADI it is possible that two or more countries will agree to a temporary rebate of the import duties for a given list of products originated in the participant countries. Generally these negotiations are conducted once a year by official representatives of the participant countries, based on recommendations provided by the interested industries, which have reached an agreement at a previous meeting, organized by ALADI for each key Latin American industrial sector.

For example, representatives of the petrochemical industry of Argentina, Brazil, Mexico, Chile and Uruguay have started negotiations under this system as early as 1963 and later on, representatives of the petrochemical industry of other participant countries have joined the club. There is no doubt that the most active participants are those countries with an already established petrochemical industry such as Argentina, Brazil and Mexico, but other countries with less-developed petrochemical industry such as Chile and Uruguay have made good use in the past of the preferential import duties given to their petrochemical specialty products by the bigger market countries. Such could be the case of pentaerythritol produced in Chile, and special PVC compounds produced in Uruguay.

PASA's synthetic rubber has been one of the earliest petrochemical products to make good use of this preferred trade concessions obtained under the ALALC-ALADI system, so presently most of its exports go to other Latin American countries under the ALADI system, using local representatives in each of the countries served. The rest of the exports goes to the U.S. and Western Europe, mostly through international traders.

Mosconi, being a petrochemical commodities producer and exporter, uses mostly international traders to sell its aromatics all through the world. The only exceptions are the U.S. markets where it is forming its own distribution system and the sales of py-xylene in Brazil to the two petrochemical users in that country, where through a bilateral arrangement through ALADI, the Argentine p-xylene has a lower import duty when entering Brazil, and the dimethylterephthalate (DMT) produced in Brazil by this p-xylene can enter the Argentine market also under rebated import duties, since DMT is still not been produced in this country.

TDI produced by PR III is presently exported to other Latin American countries (Chile, Perú, Uruguay and Colombia) under the ALADI system and using local technical representatives. Half of total exports are placed here. The other half is exported to the U.S., Canada and Western Europe using local traders and representatives.

Due to the fact that the bulk of Argentina's petrochemical exports by the joint-ventures analyzed, are either commodities or intermediates, no special after-sales services to customers abroad are provided outside of those provided by the local representatives in Latin America, which in most cases are either a technical sales organization or a local chemical producer.

Varying with the capabilities of the local representatives, and the degree of margin in the tariff protection obtained through ALADI negotiations by the Argentine petrochemical producer, has been its success in penetrating a given Latin American market.

For instance TDI produced by PR III presently covers almost 100% of the Chilean market thanks to the concurrent factors of:

- . The local representative, being a Chilean chemical and petrochemical producer, helped in negotiating the best tariff margin for imports of Argentine TDI into Chile, through equivalent concessions given by Argentina to some Chilean petrochemical export products.
- . The proximity of the markets to the production site, which has allowed a good logistic system to the supply of Argentine TDI to Chilean users.
- . The good technical service provided by the Chilean representative, which is similar in approach to that provided by PR III in Argentina.

All the petrochemical executives interviewed in Argentina expressed positive reactions regarding the benefits of joint-ventures as an instrument for establishing a petrochemical industry in the country.

Those representing private investment commented about the benefit of having governmental enterprises as minority partners in the joint-venture, not only from the viewpoint of facilitating the supply of the required raw materials, but mainly for the internal support required vis-a-vis the central government authorities, with regard to pricing policies, foreign competition protection and the like.

Similar reactions were expressed by representatives of foreign investors vis-a-vis the participation of Argentine investors in a joint-venture, for similar reasons.

As long as the joint-venture could be ran by capable professional management, with a leeway to handle the day-to-day affairs of the company, this was considered as a favorable aspect of the system, from the viewpoint of the representatives of the government enterprises, since they by nature have a restricted degree of flexibility to run a profit-oriented enterprise.

Governmental decisions, as it was indicated before, have a very strong influence in the economic performance of the petrochemical operations in Argentina. On the other hand, foreign investors and technology and engineering suppliers, as a whole, had a somewhat limited influence in both the management of the petrochemical projects and the long-term results of the petrochemical operations, albeit the basic technology which the main petrochemical development of Argentina is based on, is mostly of foreign origin.

BRAZIL

General Background

Brazil has a population estimated in a figure over 120 million inhabitants, with a literary rate a litter over 70%, a per capita Gross Domestic Product of US\$ 1.542 (1982) a possitive trade balance of US\$ 6.5 billion and an accumulated external debt at the level of US\$ 95 billion.

Since the mid-Sixties, Brazil has been under a nationalistic military regime, which for about fifteen years provided the framework for a steady economic growth, which helped the fast industrialization of the country with all the benefits and problems associated to it.

This steady and somewhat spectacular economic growth plus industrialization, which for some time was refered to as "the Brazilian Miracle", was abruptly stopped in 1981 and the overall economy has experienced a zero growth since then, causing serious political and social unrests even if the Brazilian economy is now based in solid and modern foundations.

The development of the petrochemical industry in Brazil started as a governmental high priority program in 1968 with the creation of PETROQUISA, the petrochemical arm of the state owned petroleum corporation, PETROBRAS.

The main practical reason of the creation of PETROQUISA as a separate legal entity of PETROBRAS was to allow the Brazilian government to concur, normally as a minority partner, in the formation of different joint-ventures, to materialize petrochemical projects in the country, based on the need to supply of a fast-growing substantial-sized domestic market, as the key motivation.

PETROQUISA, being initially the central focus of petrochemical knowledge and information in the country, was capable to spur the formation of multiple joint-ventures operations, clustered around core units producing the basic petrochemical building blocks required by the down-stream plants.

These joint-ventures were organized based on a few, flexible ground rules:

- . Majority of shares have to be in Brazilian hands.
- . PETROQUISA shareholding has to be at least equal to that of the biggest other shareholder.
- . If possible, PETROQUISA's participation has never to be bigger than 50% of total equity of any given joint-venture.

Based on the above framework, between 1968 and 1983, the PETROQUISA system grew up to the formation of about 30 different operating joint-ventures, grouped in three major petrochemical complexes, with a combined annual sales of about US\$ 2,750 million, including an export revenue of US\$ 550 million, during 1983.

These figures are more than 50% of the total production value of the Brazilian petrochemical industry, the balance being the output of 100% private chemical and petrochemical companies, either Brazilian or foreign.

These figures alone demonstrate the success of the joint-venture system developed by the Brazilian government through PETROQUISA, which in practice resulted in a three-sided participation:

- . A private Brazilian investor or investors, either industrial corporations, or financial or holding groups.

- . A foreign technological partner.
- . PETROQUISA

The joint-ventures analyzed in Brazil represent all the facets, types of petrochemical operations, and viewpoint sources of the different petrochemical operations within Brazil, including representatives from the joint-ventures proper, from PETROQUISA, from Brazilian groups involved in petrochemical activities and from foreign companies operating outside the PETROQUISA system in Brazil.

Outside of extensive talks with the main responsables of the creation and establishment of the PETROQUISA system, the following operations were investigated in-depth in Brazil:

- . Petroquímica Uniao S/A (PQU).- The first joint-venture established in Brazil, with PETROQUISA participation.
- . Cía. Brasileira de Estireno (CBE).- A joint venture with majority of foreign participation.
- . Rhodia S/A.- The biggest foreign company involved in the production of chemicals, petrochemicals and fibers in Brazil, mostly as a 100%-owned operations.
- . Grupo Ultra.- One of the representative Brazilian industrial groups involved in different kinds of petrochemical operations in Brazil, either alone or in joint-ventures with PETROQUISA and foreign investors.
- . COPENE - Petroquímica do Nordeste S/A.- A highly successful novel joint-venture approach to the materialization and operation of the core units within a huge petrochemical complex.

- . SALGEMA - Industrias Químicas S/A.- The first successful approach in the country in order to develop an sucro-chemical industrial complex based on ethyl alcohol from agricultural products as a replacement of petrochemical ethylene.
- . Petroquímica de Bahía S/A.- A Brazilian private holding group organized with the specific purpose of participating in petrochemical joint-ventures in Brazil.
- . PRONOR - Productos Orgánicos S/A.- A representative new petrochemical joint-venture organized within the PETROQUISA system.
- . NORQUISA - Nordeste Química S/A.- A second generation petrochemical joint-venture originated from the need of managing the profits of previous petrochemical joint-ventures.

In spite of the serious economic situation affecting the Brazilian economy during the last three years, the petrochemical industry was less affected thanks to a rapid adaptation to the new condition of disruption of domestic market growth, a serious fall in 1981 and an almost zero growth in subsequent years. The solution was to establish a joint Government-Industry effort to develop exports markets to compensate the loss of domestic markets and doing so, continuing the operation of plants at economic production levels.

The good results of this joint effort are shown in the petrochemical trade balance of the country during the last years.

Until 1978 when only one petrochemical complex was in operation in the country, annual imports of petrochemical products were at a rate of US\$ 1 billion; for 1984 it is forecast as export of petrochemicals in the order of the same US\$ 1 billion value, having obtained a net

trade gain of US\$ 2 billion by import substitution and export development.

Even if the domestic market will recover to pre-crisis levels, it is the intention of the Brazilian petrochemical to continue maintaining high levels of petrochemical exports.

A good contribution towards oil self-sufficiency is showed by the success of recent off-shore oil operations by PETROBRAS, the state oil corporation and main supplier of light naphthas to the three big petrochemical complexes already in operation in Brazil.

Company Profiles, Motivations and Objectives

1.- Company: PETROQUISA - Petrobrás Química S.A.
Rua Buenos Aires 40
CEP - 20070, Río de Janeiro, R.J., Brazil
Tel: (021) 297-6677
TELEX: 2121496

Contacts: Dr. José F. Pashoal
Director
Dr. Helio Camarota
Assistant to the Director
Dr. Amilcar P. da Silva
Technical Manager
Dr. Otto Vicente Perroni
former Executive Vice President

PETROQUISA was organized by end-1967 as a corporation with Petroleo Brasileiro S.A. (PETROBRAS) as the sole shareholder, with the

purpose of being the petrochemical holding of PETROBRAS in the formation of operating joint-ventures.

By end-1983 there were 27 operating companies organized under the PETROQUISA system, mostly of them as joint-ventures with two other partners: a private Brazilian investor or investors and a foreign investor supplying the technology and other specific operational and managerial skills.

PETROQUISA's voting capital participation in each of the companies of the system varies from a minimum of 20% to a maximum of 100%.

Most significant joint-ventures with PETROQUISA's participation will be discussed individually later in this chapter. Suffice is to mention that the operation of the PETROQUISA system during 1983 was represented by the following figures:

Total physical turnover (in thousand of metric tons):

Thermoplastics	:	942
Elastomers	:	212
Intermediates	:	1,574
Basic petrochemicals	:	2,686
Solvents	:	205
Inorganic products	:	631
Platicizers	:	25
Other	:	710
		<hr/>
TOTAL		6,985

Total invoicing : US\$ 2,750 million

Total exports (as percentage of total output and revenue):

In terms of volume	:	17%
In terms of value	:	20%

In order of importance, most significant exports were thermoplastics, followed by intermediates and basic petrochemicals.

Main raw materials supplied to the PETROQUISA system are:

- Light naphthas supplied by PETROBRAS refineries.
- Ethyl alcohol supplied by cane sugar processors.
- Natural gas supplied from PETROBRAS gas fields.
- Imported basic and intermediate petrochemicals (to balance local production).

To a large extent the PETROQUISA system is self sufficient, and together with other petrochemical producers in Brazil they provide the bulk of the petrochemical requirements of the domestic market.

Most of the production processes utilized by the companies within the PETROQUISA system were based on imported technologies. Notable exceptions are:

- . Ethylene from ethyl alcohol, a process developed by PETROBRAS.
- . MBTE from butenes, a process co-developed by PETROBRAS.

Two MBTE plants, one ready for commissioning and a second one in the drawing boards are the two newest projects, monitored by PETROQUISA to be developed by two controlled companies of the system from now until 1990.

Of course, several of the joint-ventures plants in the PETRO-QUISA system, have projects for debottlenecking or expanding present operations. Most of the brand-new projects during the coming years will belong to the specialty chemicals segment of the petrochemical industry.

2.- Company:

Petroquímica Uniao S.A.
Av. Paulista 854 - 4° andar
CEP 01310, Sao Paulo, S.P., Brazil
Tel: (011) 287-4266
TELEX: 1123594

Contacts:

Dr. Henri Couri Aidar
President
Dr. Michel Hartveld
Commercial Director

Petroquímica Uniao (PQU) was established late in 1966 with the purpose of building and operating a merchant ethylene plant, to market this basic petrochemical building block to down-stream plants to be installed at the same time with the ethylene plant.

Initial capacity was established at 200,000 MT/year ethylene production, plus all co-products generated by cracking of naphta, since this was the only hydrocarbon raw material available at the selected plant site: Capuava, in the main road between Sao Paulo and the port of Santos.

Naphta was intended to be supplied by a nearby oil refinery, belonging to one of the private Brazilian partners and main promotor of the new petrochemical venture: Petroleo Uniao S.A.

Other Brazilian private investors were invited to participate, to complete 60% national participation, and a foreign investor (Phillips Petroleum) participated initially with the remaining 40%.

During the process of negotiating the contract sale of ethylene to potential down stream users, it was necessary to expand the production capacity design to 300,000 MT/year and a new financing scheme was established, with the withdrawal of Phillips Petroleum from the project and the incorporation of the recently created PETROQUISA, initially as minority partner.

The PQU project was finally commissioned in 1972, in synchronization with the down-stream projects developed by other companies not associated with PQU.

In 1981 a debottlenecking was completed, a present production capacity is the following: (in thousands of metric tons-per-year)

Ethylene	:	360
Propylene	:	204
Butadiene	:	50
Benzene	:	133
Toluene	:	20
O-Xylene	:	35
Mixed xylenes:		44
Other products :		73

The main raw material, light naphta, is supplied by a nearby PETROBRAS petroleum refinery, at Cubatao; the olefin production and separation use Lummus technology and the aromatic units use technology supplied by Lurgi and Engelhard.

PQU present ownership is as follows:

PETROQUISA	:	67.79%
UNIPAR <u>1/</u>	:	28.59%
International Financing Corp. (IFC)	:	2.57%
Other	:	1.05%

1/ UNIPAR is the biggest private petrochemical holding in Brazil, organized by the founding groups of PQU.

Total PQU sales in 1983 reached US\$ 494 million, of which 12%, or about US\$ 60 million were exported, mainly as aromatic products (benzene, toluene, xylenes). Production levels has been close to 100% if design capacity during the last years, generating a steady income to the shareholders.

Some thought have been given to the reduction of PETROQUISA's participation in PQU in order to be around 50%, more in line with other joint-ventures in the PETROQUISA SYSTEM, but no decision in the approach to that goal has been agreed upon yet.

No future growth or expansion of present PQU operations in Sao Paulo can be considered, because the Federal Government and the State Government have determined that the petrochemical industry has not to be expanded further in the heavy industrialized Sao Paulo region, due to industrial concentration problems and associated pollution problems.

Therefore, other petrochemical core units were established through PETROQUISA's planning in different regions of the big country, the most noticeable were that of Camacari in the State of Bahia, and that of Triunfo at the State of Rio Grande do Sul.

3.- Company: Companhia Brasileira de Estireno (CBE)
Rua Paes Leme, 524 - 9º andar
CEP 05424 - Sao Paulo, S.P., Brazil
Tel: (011) 815-5111
TELEX: 1125037 CBDE-BR

Contact: Dr. Takashi Sanefuji
Director - President

CBE was founded in 1953 by three foreign chemical companies, with the purpose of producing styrene to supply the incipient Brazilian market with this important petrochemical intermediate.

Initial production capacity was 5,000 - 10,000 MT/year, located in Cubatao, Sao Paulo, close by an oil refinery of PETROBRAS there, which was to supply benzene recovered from a reforming unit. Initially ethylene was produced captively by CBE by ethyl alcohol dehydration and later on was purchased from PETROBRAS, which at the Cubatao refinery could produce refinery gas ethylene for CBE needs.

In 1972 the old plant was closed, and a brand-new 60,000 MT/year styrene plant was commissioned, based on ethylene and benzene supplied by the new basic petrochemical center of Petroquímica Uniao, commissioned around the same time. The technology used in the new CBE plant was supplied by Badger.

This new plant was debottlenecked in 1983, so present production capacity is around 80,000 MT/year.

As a matter of record, during 1983 the plant produced 83,000 MT of styrene, with a sale value of US\$ 70 million. Of this output, 80,000 MT were sold in the Brazilian market and 3,000 MT were exported to Japan and the U.S.

Ownership of CBE changed markedly since the establishment of the company until today.

Originally CBE was established as a partnership among three foreign chemical companies: Koppers with a little over 50% of the shares, and Firestone and Hüls taking the balance.

In 1969, when decision was taken to proceed with the new styrene plant, the principal end-market of which was a new synthetic rubber plant to be built by PETROBRAS, it made advisable to invite PETROQUISA as shareholder in replacement of Firestone, with 23% of CBE shares.

During 1976, Koppers decided to withdraw from the chemical business, both in Argentina and Brazil, so Monsanto decided to purchase Kopper's polystyrene operations in Brazil, as well as its shares in CBE.

Presently CBE ownership is as follows:

Cía. Brasileira Plásticos Monsanto	33%
Industrias Monsanto S.A.	15%
Hüls do Brasil Ltda.	28%
PETROQUISA	23%
Other small investors	1%
	<hr/>
	100%

No further expansion is planned by CBE for styrene production in the Sao Paulo area, due to industrial growth limitation and pollution

control, so most profits are distributed as dividends.

Monsanto decision to enter the Brazilian petrochemical activity purchasing a great part of Kopper's holdings in the country was due to the fact that styrene and polystyrene production is very much in line with Monsanto expertise in other country and besides, Monsanto was willing to participate as a minority partner in Brazil's petrochemical development according with PETROQUISA's scheme of partnership discussed before.

4.- Company : Rhodia S.A.
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P.O. Box 60561
CEP 05804, Sao Paulo, S.P., Brazil
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TELEX: 1124391

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Chairman of the Board
Dr. Joao Paulo Sommers
Director - Chemical Division

Rhodia was established in Brazil in 1919 as a wholly-owned subsidiary of Rhone-Poulenc, France.

Based on an important and growing domestic market, Rhodia diversified its production into synthetic fibers and their precursors, industrial chemicals, films and pharmaceutical and agrochemical products, directly or through a variety of subsidiary and affiliated companies, where in most of them, Rhodia retains voting control.

Total revenue in 1982, last year with published information, was the equivalent in cruzeiros of US\$ 735 million, with textile products and industrial chemicals and petrochemicals contributing about 90% of this amount. Exports that year were around US\$ 43 million, or about 6% of total sales.

Annual investment in new projects, mostly in the petrochemical segment of the company, were at a rate of US\$ 80 million per year, during the last three years. Representative projects carried out by Rhodia and related companies during this period were:

Acrylonitrile, expansion from 60,000 MT/y to 72,000 MT/y
Adiponitrile, new project of 30,000 MT/y
Methionine and its raw materials.

All these projects are entering production between 1983 and 1984.

Even if the main operations of Rhodia are still concentrated in the great Sao Paulo industrial belt, most of grass-roots new investment are materializing in the Camacari petrochemical complex (see COPENE profile) or in Cabo, Pernambuco, where Rhodia has developed a substantial synthetic fibers operation.

For all legal purposes, Rhodia continues to be a 100% foreign capital corporation, even if due to its size and diversification it has developed domestically most of the capabilities and technical and managerial support, in order to operate quite independent from the mother company.

Every now and then some soundings have been made in order to attract local capital to participate in Rhodia's ownership, but due to the fairly low rate of return of the investment, compared to other investment alternatives, these soundings have not been successful.

Another new approach being explored, is the formation of joint-ventures with local chemical companies, to develop new projects. The methionine project is one of these cases, where Rhodia is participating with UNIPAR (see Petroquimica Uniao profile) in a 50/50 venture to invest over US\$ 40 million to produce methionine and some of its raw materials.

Another case in hand is ACRINOR, where Rhodia has a 35% participation (the other shareholders are PETROQUISA: 35% and other private Brazilian investors: 30%). Acrinor has just completed an expansion of its acrylonitrile plant to 72,000 MT/y in the Camacari petrochemical complex at Bahia, in order to supply this intermediate to two acrylic fibers plants existing in Brazil, as well as the adiponitrile plant just being commissioned by Rhodia.

Another interesting joint-venture formed with Rhodia participation some years ago was a US\$ 75 million, 90,000 MT/year terephthalic acid (TPA) plant, in a 75/25 arrangement with Amoco Chemical Corp. of the U.S., which was the technology supplier.

The new joint-venture, Rhodiaco Industrias Químicas S.A. commissioned the TPA plant during 1977, with a 75,000 MT/year initial capacity which was later debottlenecked in order to reach the present 90,000 MT/year operating capacity.

It is not simple to anticipate future growth of Rhodia's operations in Brazil, due to its highly diversified character, but in view of increasing availability of petrochemical intermediates and the very solid position attained by Rhodia in the fiber and specialties markets in the country, it seems logical to expect future growth oriented towards those lines.

On the other hand, Rhodia is facing an increasing internal

competition from other Brazilian producers, not only with regard to the access to domestic markets but, perhaps more important, with regard to the authorization to develop new industrial projects.

The Industrial Development Council (CDI) is the Brazilian Federal government organization responsible with the industrial sectorial planning and development, and its approval for a new project is mandatory in order to apply and obtain certain investment incentives such as the importation of needed equipment duty-free.

If two industrial groups are applying for the same project and there is room only for one plant, under similar conditions there is little for doubt that the CDI would prefer the project presented by a local industrial group in comparison to that presented by a foreign-owned company, such as Rhodia. This is a problem that Rhodia may have to face in the future, in view of a certain degree of project saturation in the country, particularly with regard to the most obvious and simple petrochemical developments.

Rhodia's top management understand this predicament and they are open to the formation of joint-ventures with national investors and also under the PETROQUISA system. Due to their long experience in the country, they expect to continue to assume managerial responsibilities in the new joint-ventures, as they have done in the past.

5.- Company:

ULTRA Group

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CEP 01317 Sao Paulo, S.P., Brazil

Tel: (011) 285-2722

TELEX: 1131487 UGAZ BR / 1122971

Contact:

Dr. Pedro Wongtschowski
Director of Development, Chemical Division

The Ultra Group of companies is a Brazilian industrial conglomerate, belonging to the category of the 50 largest domestic groups in the country, with an annual invoicing over US\$ 450 million, including LPG distribution, chemical and petrochemical production, agro-industry, transport and storage of bulk products, real state and construction, and ancillary activities.

In the process of diversifying since its foundation in 1937, ULTRA entered very early into the nascent petrochemical industry in Brazil, having participated for a while in the Petroquimica Uniao project (see corresponding industry profile).

Later on and after withdrawing from PQU project, Ultra promoted the creation of a petrochemical joint-venture to produce ethylene oxide and its derivatives: Oxiteno.

Oxiteno has been a highly successful endeavor with two petrochemical minicomplexes already in operation and a third one, based on sugar cane ethyl alcohol and using its own developed technology, already in the construction stage.

Oxiteno S.A. and its sister companies, Oxiteno do Nordeste S.A. and Oxiteno de Alagoas S.A. have the following shareholding composition:

Ultra Group	20,88%
PETROQUISA	20,88%
Lokab S.A.	20,88%
International Finance Corp.(IFC)	14,76%
Monteiro Aranha Group	12,60%
Oxichem, U.S.A.	10,00%
	<hr/>
	100,00%

The only foreign partners in Oxiteno are the International Finance Corporation (IFC), which the investment arm of the World Bank and Oxichem, which is the investment arm of Scientific Design, the technology supplier.

Combined installed capacity of Oxiteno's two production centers in Maua, Sao Paulo, and Camacari, Bahia, is:

Ethylene oxide	:	140,000 MT/year
Ethylene glycols	:	150,000 MT/year
Ethanol amines	:	15,000 MT/year
Glycol ethers	:	26,000 MT/year
Ether acetates	:	3,500 MT/year

Main raw material ethylene is supplied by PQU at Sao Paulo and by COPENE at Camacari, Bahia.

The third production center under construction by Oxiteno will be located in Maceio, Alagoas, to make good use of the industrial infrastructure already developed by SALGEMA there (see corresponding company profile) and the ample availability of ethyl alcohol from sugar cane which exists in this region.

The sucrochemical development by Oxiteno de Alagoas is the following:

Acetaldeyde	:	55,000 MT/year
Acetic acid	:	14,000 MT/year
n-Butanol	:	30,000 MT/year
Butyl acetate	:	10,000 MT/year

Again it is important to underline that the production technology for all these plants was developed completely by Oxiteno R&D staff, with the express purpose of developing a technology to utilize in chemical production an abundant natural resource in Brazil: sugar cane.

In order to upgrade further the ethylene oxide produced by Oxiteno in its two production centers, Grupo Ultra formed two other joint-ventures: Atlas Industrias Quimicas and Etoxilados do Nordeste.

These two joint-ventures were established, respectively in Maua, Sao Paulo in 1973 and in Camacari, Bahia in 1979, in order to manufacture a great variety of oxyethylates derivates such as oxyethylated alkyl phenols, oxyethylated sorbitol esters, oxyethylated fatty alcohols and the like.

Share distribution in Atlas Industrias Quimicas S.A. and Etoxilados do Nordeste S.A. initially were the same in both joint-ventures:

ICI (through Atlas Co. U.S.A.)	75%
Ultra Group	25%

Atlas (later ICI) was the supplier of the oxyethylation technology.

Due to the experience already obtained by Ultra in the first operation by Atlas Industrias Quimicas S.A. in Maua, when the

decision was taken to establish a second operation in Camacari, it was possible for the local partner to obtain a bigger participation in the decision-making process there.

This increased participation in the day-to-day operation of a fairly complex petrochemical operation, finally placed Ultra in a position to negotiate with the foreign partner its withdrawal from both joint-ventures, an agreement finally reached by end-1982. As a result, since 1983 Ultra is the sole responsible and owner of both operations in specialty chemicals, with a turnover in the range of US\$ 30-35 million per year.

6.- Company: COPENE - Petroquímica do Nordeste S.A.
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Former President
Dr. Jose Juca Bezerra Neto
President

COPENE was created in 1971 as a 100% PETROQUISA subsidiary with the purpose of establish and operate the petrochemical core units of a second petrochemical complex, to be developed, in the State of Bahia, in the Northeastern Region of Brazil.

COPENE was also to collaborate with PETROQUISA and other governmental organizations, particularly the National Bank for Economic Development (BNDE) in the promotion of the establishment of all necessary down-stream units to be integrated into this petrochemical project.

For this purpose, three concurrent actions were taken:

- PETROQUISA was responsible of the formation of the corresponding joint-venture companies, according with the tripartite model (already discussed under the PETROQUISA system).
- The BNDE was to provide the necessary long term financing required for the purchasing of equipment, engineering services and other capital goods, representing the domestic component of the fixed investment required for each new petrochemical project.
- COPENE besides of assuring the availability and equal access to the necessary basic petrochemicals required in the complex (ethylene, propylene, benzene, xylenes, etc.) was also to provide centralized services, such as electricity, steam water, etc.

The novel approach of the COPENE participation, was that the down-stream petrochemical joint-ventures, once established, had access to purchase a percentage of shares in COPENE, in certain proportion determined by the amount of raw materials to be consumed from COPENE.

Under this scheme, when COPENE commissioned in 1978 the core units and service plants in the new petrochemical complex at Camacari, Bahía, about 15 down-stream companies were participating with 47,88% of COPENE shares; PETROQUISA kept 48,16%, and the balance was in the hands of other investors. Main raw materials used were light naphtas, gas oil and natural gas supplied by a nearby PETROBRAS oil refinery and gas fields. Technology used for the olefin production and separation was LUMMUS and the aromatics sections was UOP.

At the commissioning time, in 1978, COPENE has a given basic petrochemical production, based on the cracking of light naphthas and gas oil, as well as in the reforming of liquid fractions, in order to obtain aromatics. Through a process of debottlenecking and expansion, 1984 production capacity is now larger in most of the plants as it is indicated below (figures in thousand metric tons per year):

<u>Products</u>	<u>Production Capacity</u>	
	<u>1978</u>	<u>1984</u>
Ethylene	388	460
Propylene	200	243
Butadiene	52	52
Butenes	79	79
Benzene	130	172
Toluene	17	67
o-Xylene	40	49
p-Xylene	83	86
MTBE <u>1/</u>	-	60

1/ MTBE is a compound corresponding to methyl-tert-butyl ether, synthesized from isobutylene and methanol. Its main use is as high-octane motor-gasoline component (up to 11% in the gasoline pool).

Initial investment in COPENE was around US\$ 700 million, but the whole petrochemical complex in Camacari at present has required an accumulated investment of over US\$ 3,000,000,000.- if the 25-odd down stream plants already in operation are included.

Those down-stream joint-ventures which opted to take shares in COPENE's capital (17 in total) decided in 1980 to organize a holding company, transferring to the new company the share participation they had at the time in COPENE.

So a new petrochemical joint-venture, NORQUISA, was born and its role in the containing development of the petrochemical industry in Brazil will be analyzed later in the report.

From the start-up of its operations in 1978, COPENE has quite fulfilled the role assigned by its PETROQUISA planners, allowing the smooth operation of a big, diversified petrochemical complex, most probably the largest in the developing world.

During 1983 COPENE operated at close capacity, with the exception of a programmed 25-day maintenance and debottlenecking stop. In any case, total sales of basic petrochemicals plus some solvents and pyrolysis residues was over 1 million tons of products.

Total sales revenue in 1983 including those coming from the sales of utilities was around the equivalent in cruzeiros of US\$ 800 million, of which 80% corresponded to sales of basic petrochemicals to the domestic markets, the balance being represented by the sales of utilities to the down-stream operations within the complex and direct exports of petrochemicals.

Direct exports during 1983 was represented by aromatics petrochemicals (mainly o-xylene) and solvents (C9), with a total value of US\$ 30 million.

Indirect exports during the same period, through exports done by the down-stream joint-ventures, represented about 38% of COPENE's total sales, expressed as tonnage.

Outside of the normal expansion of present operations in the core units of the petrochemical complex at Camacari, COPENE is presently involved in the following programs:

- Substitution of fuel oil by coal, biomass, natural gas and other fuels, in view of the heavy dependence of the country on imported oil.
- Upgrading of some co-products as it is the case of the recent commissioning of the MTBE plant.
- Participating in the equity of some joint-ventures, either down-stream operations or supporting activities, in order to facilitate the smooth operation of the overall complex, including the transportation and storage of the end-products of the complex, to a maritime terminal at the nearby port of Aratu, in order to expedite sales.

After all the expenses and investments represented by these programs, COPENE still has a significant profit margin, which after taxes implies a dividend fund to be distributed among the present shareholders, whose voting participation is as follows:

PETROQUISA	:	48.16%
NORQUISA	:	47.19%
Individual shareholders	:	4.65%

This dividend income is presently the main cash flow generation for the second generation joint-venture NORQUISA, which main objective is to develop new chemical and petrochemical activities in the Brazilian Northeast.

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Executive Director

NORQUISA was established in 1980 as a chemical and petrochemical holding to represent 17 (now 16 due to a merger) downstream companies operating in the petrochemical complex at Camacari. These companies each one being also a joint-venture, are the following:

<u>Company</u>	<u>Shares in NORQUISA</u> (%)	<u>Main production</u>
CPC	13.30	VCM - PVC
PRONOR <u>1/</u>	13.30	DMT-TDI-MDI
EDN	10.34	Styrene-Polystyrenes
Politeno	10.34	Low density polyethylene
Ciquine Petroquimica	8.87	Oxo alcohols
Oxiteno Nordeste	7.85	Ethylene oxide and glycols
Polialden	7.85	High density polyethylene
Acrinor	7.39	Acrylonitrile
Nitrocarbono	7.39	Caprolactam
Polipropileno	7.39	Polypropylene
Ciquine Quimica	2.95	Phthalic anhydride
Copenor	0.74	Formaldehyde
Deten	0.74	Detergent raw materials
Melamina Ultra	0.74	Melamine
Metanor	0.74	Methanol
Sulfab	0.07	Sulphuric acid
	<hr/> 100.00%	

1/ PRONOR will be discussed separately.

Total invoicing of the 16 joint-venture companies in 1982 (late figures available) was in the range of US\$ 1.3 billion. Directly or

indirectly, PETROQUISA is a minority shareholder in 14 of these joint-ventures.

Besides COPENE, which is the main investment, NORQUISA is already participating in two other important industrial chemicals development in the Northeastern Region of Brazil, both based in the chemical utilization of sugar cane ethyl alcohol:

- COPERBO in Cabo, Pernambuco, oriented to the production of synthetic rubbers, acetic acid and vinyl acetate.
- SALGEMA in Maceio, Alagoas, oriented to the production of chlorine chemicals and alcohol chemicals.

NORQUISA's new development are oriented to the manufacturing of specialty chemicals derived from petrochemical raw materials such as nitrobenzenes, chlorobenzenes, epichlorhydrine and the like.

Total new direct and indirect investment with NORQUISA participation, is estimated in the order of US\$ 650 million, to be carried out until 1985-1986. One of the most important is a new, 80,000 MT/year vinyl acetate project, being under construction in the COPERBO complex in Cabo, Pernambuco.

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President

SALGEMA was born in 1966 as a joint-venture between Brazilian private investors and the Du Pont company of the U.S., in order to exploit an underground rock-salt deposit in Maceio, State of Alagoas in the Northeastern Region of the country.

Initial project was a 100,000 MT/year chlorine plant via electrolysis of salt, to be transported by barges to the industrialized Sao Paulo Region in the South.

Before the project reached an irreversible path, decision was taken by the Industrial Development Council (CDI) to promote the installation of an ethylene dichloride (EDC) plant, next to the chlorine plant, using ethylene to be furnished by COPENE from the petrochemical complex at Camacari, Bahia, and the chlorine to be produced by SALGEMA.

The EDC project was thought to be at least 300,000 MT/year implying the caustic-chlorine plant to be redesigned with an annual production capacity of 250,000 MT of caustic soda and 220,000 MT of chlorine.

Between 1977 and 1979 both plants began to operate by SALGEMA. The main product EDC was partly shipped back to Camacari to be further processed by CPC into vinyl chloride (VCM) and polyvinyl chloride (PVC), and partly was exported.

In 1981 Du Pont withdraw from this investment and both COPENE and NORQUISA joined PETROQUISA as partners in this venture. PETROQUISA was already a shareholder of SALGEMA since 1975, replacing the founding partner of this venture.

Since 1981 ownership of SALGEMA is as follows:

COPENE	35.25%
NORQUISA	34.53%
PETROQUISA	30.22%

The most significant factor in SALGEMA productive structure was the commissioning in 1981 of a 60,000 MT/year ethylene plant, based on dehydration of sugar cane ethyl alcohol, using a process developed by CENPES, the R&D branch of PETROBRAS. This plant as well as the EDC plant were debottlenecked during 1983, so present production capacity is as follows:

Caustic soda	:	250,000	MT/year
Chlorine	:	220,000	MT/year
Ethylene	:	80-90,000	MT/year
EDC	:	326,000	MT/year

With this captive production of the raw material ethylene, SALGEMA is now in a position to integrate its present production scheme, which is only basic and intermediate raw materials, with some down-stream products, forming joint-ventures or other arrangements with interested partners.

This concept has received ample support from the State of Alagoas authorities, so the first steps were already taken towards the creation of a chlorine-chemical complex in Maceio, with SALGEMA playing a similar role as COPENE played in the past in developing the petrochemical complex at Camacari, Bahia.

Some of these down-stream projects already being materialized or in the drawing-board in Maceio are:

- . A new VCM-PVC project by CPC .

- . An ethyl alcohol derivatives complex by Oxiteno
- . A chloromethanes plant
- . An epichlorohydrin plant
- . A vitamin C plant

Investment required for the ethylene plant was in the order of US\$ 27 million and it took four years to materialize, including the technology development stage and the basic engineering stage. This has to be added to a US\$ 200 million previously invested in the other plants.

Estimated sales during 1983 were 210,000 MT of caustic soda and 270,000 MT of EDC. Both products were also exported world-wide.

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President

PRONOR, as well as Nitrocarbano (caprolactam producer) and former Isocianatos do Brasil (toluen-diisocyanate producer) were born as joint-ventures promoted by PETROQUISA and a holding company formed for this exclusive purpose: Petroquímica da Bahia (PdB).

PdB was the brainchild of a banking family from Salvador, Bahia, with interests there and with the early concept of participating in any future petrochemical development in the region.

After some abortive planning, PdB could really start with concrete measures after PETROQUISA was born and a viable scheme could be developed jointly.

PdB together with PETROQUISA developed the necessary arguments in order to freeze the expansion of the Sao Paulo petrochemical production, in order to give room to a second petrochemical pole, that of Bahía, which finally crystalized in the form of COPENE being the responsible of the operation of the core units in a new petrochemical complex at Camacari.

At that time PdB was legally established as an investment corporation and the area of activity was defined: the production of two synthetic fiber intermediates (DMT and caprolaclam), and the production of isocyanates as intermediates for polyurethane foam manufacturing. The three petrochemical intermediates are produced from aromatics (benzene, toluene and p-xylene) which would be available in enough quantities from COPENE's core units.

Initially the idea was a straight purchase of the required technology from foreign suppliers, but eventually the concept of a tripartite arrangement prevailed, which forced to split the initial project among three joint-ventures, due to the different foreign technological partners to participate in each project.

Therefore, these three joint-ventures were created around 1974, with the following ownerships:

A.- PRONOR Productos Organicos S.A.

Petroquimica da Bahia	:	33.3%
PETROQUISA	:	33.3%
Dynamit Nobel. (West Germany)	:	33.3%
		<hr/>
		100.00%

Project	:	60,000 MT/year of dimethyl terephthalate (DMT)
Total initial investment	:	US\$ 65-70 million
Start-up-date	:	1977 (using at first imported raw material)

B.- Isocianatos do Brasil S.A.

Petroquimica da Bahia	:	20%
PETROQUISA	:	20%
DuPont (U.S.A.)	:	40%

Project	:	22,000 MT/year toluen disocyanate (TDI)
Initial investment	:	US\$ 90-95 million
Start-up date	:	1979

C.- Nitrocarbono S.A.

Petroquimica da Bahia	:	26.5%
PETROQUISA	:	26.5%
Other local investor	:	26.5%
D S M (Hoiland)	:	20.5%
Project	:	35.000 MT/year caprolactam
Initial investment	:	around US\$ 100 million
Start-up date	:	1978

Due to different problems during construction and first years of operation, mostly with regard to the return of the investment and the financial requirements of some of the projects, the shareholders structure was quite modified in the three joint-ventures and, since 1983 only two joint-ventures remain, since PRONOR absorbed Isocianatos do Brasil and its operations.

Present shareholding structure is:

PRONOR.-

Petroquimica da Bahia	50%
PETROQUISA	48%
Metanor	2%

Nitrocarbano.-

Petroquimica da Bahia	6.5%
PETROQUISA	32.0%
COPENE	50.0%
Other local investor	6.5%
D S M	5.0%

During 1983, PRONOR produced 55,000 MT of DMT of which 20,000 MT were exported. Also from 24,000 MT of TDI produced some 3,000 MT were exported.

In the same year Nitrocarbano produced 36,000 MT of caprolactam, of which 5,000 MT were exported.

PRONOR's export value in 1983 was US\$ 15 million and that of Nitrocarbano was US\$ 8 million.

PRONOR's future projects are closely related with the start-up of a methylene diphenylene isocyanate (MDI) operation associated with the TDI plant, as well as the development of the isocyanate systems which will allow the company a sound and solid penetration in the market of raw materials for all kinds of polyurethanes.

Nitrocarbano's projected caprolactam expansion from 35,000 MT to 70,000 MT/y has been shelved, waiting for market development.

Critical Comparative Analysis of the Joint-Venture Elements.

The very important fact of the existence of well defined, but flexible ground rules for the establishment of joint-ventures, almost at the beginning of the development of a petrochemical industry at a national level in Brazil, or better, because the existence of these ground rules and the creation of PETROQUISA, allowed the development of the petrochemical industry of the country in an orderly fashion, the joint-ventures created within the PETROQUISA system have a lot of common elements, in contrast to the Argentine experience.

Moreover, different regulatory and financing agencies of the Federal Government of Brazil have had a very active participation during every stage of most petrochemical projects materialized in the country. As examples one can mention the following:

a) The Industrial Development Council (CDI).

It is the regulatory agency while granting permission for the installation of new industries, gives them access to certain investment incentives, such as duty exemption for imported capital goods needed in plant construction. When there were more than one interested investor for a given project, CDI intervened in order to reconcile interests and obtain the joining of forces. Such have been the case in the establishment of Nitrocarbano (see PRONOR profile) or in the formation of Unirhodia, as a 50/50 joint-venture between UNIPAR and Rhodia for the manufacture of methionine and its raw materials (see Rhodia profile).

b) The National Development Bank (BNDE).

The governmental financing organization has been a key factor in the establishment of the petrochemical industry in Brazil, particularly in the financing of most of the plants included in the Camacari petrochemical complex (see COPENE profile).

Besides and with a longer-lasting impact, BNDE local financing allowed a marked domestic capital goods participation in the different petrochemical projects, since BNDE financing terms were as much or ever more attractive to the project owners than external financing, and therefore, they were strongly inclined to purchase their equipment needs locally.

As a result, Brazil could develop a strong and diversified process equipment manufacturing industry and therefore, the latest petrochemical plants erected in Brazil may have up to 80% on local components.

A typical financing package developed by BNDE for application in projects in the Camacari petrochemical complex, was used in the financing of PRONOR's DMT plants.

Of a total fixed investment in the range of US\$ 65-70 million, about US\$ 25 million was the initial equity contributed by the partners and the remaining capital needs were obtained from a syndicated line of credit organized by BNDE and with participation of the Inter-American Development Bank (IDB), in order to cover the purchase of foreign equipment. (IDB is a regional development bank, providing long-term loans for projects with national or regional interests. It has participated significantly in the financing of petrochemical projects all through Latin America).

The joint BNDE-IDB loans to PRONOR and the other projects in the Camacari petrochemical complex, typically was granted for a 15-year repay period, including a 5 year grace period, and with 9% annual interest for the foreign component of the loan, and 8-9 years and 6% annual interest, for the local component of the loan.

BNDE also had an investment arm, FIBASE, to participate temporarily in the equity formation of new basic petrochemical projects,

until private investment will become available. That was the case of COPENE, where its initial capital was entered by PETROQUISA and FIBASE, until the downstream projects began to materialize and their joint-venture owners started to get equity participation in COPENE, according to plan and in doing so, displacing FIBASE from COPENE ownership. Presently FIBASE shares in COPENE are represented by NORQUISA (see NORQUISA profile).

In this fashion, BNDE contributed to the early investment needs of important petrochemical projects, but later allowed the participation of private industry, when the system has reached a consolidated stage.

c) The Inter-Ministerial Price Commission (CIP).

In view of the existence of a chronic inflation economy in the country, the Brazilian federal government has long established CIP, in order to assign and regulate domestic prices to a long list of products, considered important to the Brazilian economy. Most high-volume petrochemicals have integrated CIP lists.

Maximum selling prices are assigned taking into consideration, among other aspects, the individual production costs for each product, as developed and presented by the interested producing company. When there are price increases for the raw materials, mostly due to inflation, the producing companies are generally allowed to transfer these cost increases to their product selling prices.

For companies such as Cía. Brasileira de Estireno, CBE (see profile) this has been a life or death situation, since its sole product styrene, is in the midst of a petrochemical production chain; styrene production requires two basic raw materials: ethylene and benzene, and at its turn is a raw material to several petrochemical endproducts such as polystyrenes and synthetic rubbers. Fortunately

for CBE, this cost-price transferring process have worked positively most of the time and the company has managed a smoothy price transfer until now. Different has been the early times of some new petrochemical projects, for example the caprolactam plant built by Nitrocarbano.

Besides the production complexities of the caprolactam process, the product has to compete with another producer (Rhodia) using quite a different route to manufacture nylon fiber raw materials.

Selling prices assigned to caprolactan by CIP plus competition, eventually didn't generate possitive margin of return for the investment of new sources of fresh capital were required lately, which was reflected in a substantial change in ownership in the joint-venture, as it is shown under PRONOR's profile.

d) The International Trade Bureau of the Bank of Brazil. (CACEX)

Due to substantial foreign exchange requirements for oil imports (close to US\$ 10 billion in 1981) and the foreign debt service requirements, Brazilian monetary authorities place a very close control and monitoring on foreign expenses, particularly non-esencial imports, which is done by the regulatory powers of CACEX.

As a result, domestic production is highly protected by tariff barriers and other non-tariff measures which, for all practical purposes, eliminate most of foreign competition.

This has been particularly the case of most petrochemical producers in Brazil, which, because they have already demonstrated their capability to supply the requirements of the domestic markets for the most important petrochemicals, do not experience any competition from abroad:

On the other hand if by one reason or another, it is required to import some supplementary quantity of any given petrochemical, the interested party has to justify to CACEX this need, before import permits are granted.

e) Petrobras Comercio Internacional S.A. (INTERBRAS).

INTERBRAS is an international trading company, affiliated to Petrobras and thought initially to make good use of the bargaining power generated by the world-wide oil purchases done by the parent company.

During 1981, when the domestic market stopped its steady growth initiated since late sixties, most Brazilian petrochemical producers found themselves with recently commissioned plants and no domestic market big enough to operate them at economic levels of production. At that time, INTERBRAS took the responsibility to place excess production in international markets, absorbing marketing costs whenever necessary.

This new marketing channel, was automatically available to any petrochemical joint-venture with PETROQUISA partnership, which wanted to sign a marketing arrangement with INTERBRAS, and there is no doubt that this measure alone, which presently continues under modified arrangements, saved a substantial part of the petrochemical industry of the country from a very difficult predicament.

Thanks to this recently developed export activity, the petrochemical industry has been less affected than other industrial sectors, by the present recessionary period experienced by the Brazilian economy.

As one can easily deduct from this brief description of the rule

of governmental agencies and corporation, plus the all-encompassing presence of PETROQUISA, during the joint-venture inception, project materialization, plant operation and domestic and international marketing of petrochemical products, there is little room left for maneuvering by the joint-venture managers, outside the improving production efficiency and operations profitability of present plants, the key decisions such product pricing, raw materials supply, investment financing and sales policies being largely taken care by the established system.

As one key executive interviewed has well pointed out, the petrochemical production system in Brazil is a "closed and balanced system, which has survived thanks to a continuous effort in keeping and improving the over-all efficiency of it."

As the bulk of the domestic market needs are already covered by present production capacity, with ample margin for exports, the efficiency is thought in several cases through product diversification.

A good example are the present efforts done by PRONOR to diversify into new urethane systems and their raw materials and the effort done by Rhodia to diversify into acrylonitrile derivatives.

It is important to point out at this time that some diversification schemes thought by local partners, in joint-ventures organized under the PETROQUISA tripartite system, may encounter, and this has been proven in more than one case, with the reluctance or straight rebuttal from the foreign partner, if the diversification proposed will fall outside the technological realm or market interest of the foreign partner.

The way that this real problem was solved in Brazil, was through a negotiated buying-out of the foreign partner, once the local partner acquired enough experience in order to run the company and to manage the technological factor involved in the diversification process.

The management capability by the local partner could be developed in a more or less easy way in those cases when the local investor was an industrial concern or when the local holding or financing institution were active participants. The chief executive officer (CEO) in most joint-ventures analyzed was either appointed by the local private investor or by PETROQUISA; only in a minority of cases the CEO was appointed by the foreign partner.

The active presence of the local partner, either the private investor or PETROQUISA, from the inception of the joint-venture under the PETROQUISA system, allowed the national participants to take all important decisions starting from the selection of the technology and therefore, the determination of the foreign partner who will supply the technology and, with his participation, the selection of the engineering company suitable to provide the basic engineering and overall coordination of the project. It is important to point-out that the large participation of domestically procured equipment for plant construction, obliged the international engineer-constructors to establish local offices in Brazil, or to form ad-hoc joint-ventures in Brazilian process engineering companies, in order to carry out most of the detailed engineering and procurement in Brazil, with the corresponding engineering technology transfer, to local professionals.

There are in Brazil three or four engineering companies, specialized in process industries (oil refineries, chemicals and petrochemicals, energy, pulp and paper, etc.) which presently are capable to participate in international engineering projects in different countries in Latin America.

Once the proper engineering package was structured (mostly based on the experience with the selected technology) and the financing scheme organized (in the lines already described), the new joint-venture appointed a project manager either coming from one of the participant partners (PETROQUISA included), or an independent professional project manager (which was the case of Petroquímica Uniao's ethylene project), in order to take overall responsibility in the project materialization.

Most of the projects were completed within schedule and within reasonable proximity to budgetary forecasts.

The few cases reported of deviations from either schedule or budget, can be attributable not to project mismanagement but to partners disagreement on investment policies and participation. In one of the cases analyzed, the projected initial investment budget was overrun by over 40% due to the need of total restructuring of the initial financing scheme, very early after plant construction began.

Again the experience gained by local partners during construction period, plus the provision for training abroad of the key operation personnel, allowed for a smooth and short start-up period of most of all plants analyzed, with only a few exceptions not attributable to plant design but to defective equipment or insufficient ancillary installations, which were promptly solved by the engineer-construction firms involved in the corresponding project.

In a very dynamic situation, as the petrochemical industry in Brazil experienced during the last decade, it is important to analyze the role-playing of the three different partners participating in a joint-venture, according to the tripartite was established in the PETROQUISA system: the local private investor, PETROQUISA, and the

foreign-technology-supplier partner. At the moment of the project inception and joint-venture definition, the leader role was taken by PETROQUISA, due to its better knowledge on market demands, minimum economic plant capacities, technological alternatives, raw material availability, plant site alternatives, etc. The local partner in most cases followed the lead and its participation started to be more significant at the time to select the foreign partner to bring in the needed technology and also at the moment of determining the financial package required. Once the technological partner was selected by common agreement between the local partner and PETROQUISA, normally an interim organization was formed, in order to put together all project elements, as well as in obtaining all necessary permits and benefits to be granted to the new operation, particularly with regard to raw material availability, duty exemptions on imported equipment and, in the case of the local partner, the possibility of the application of a tax deferment benefit on profits invested in the new petrochemical venture. (This benefit was only applicable to new investments in the economical depressed Northeastern Region of Brazil, when the Camacari petrochemical complex was developed).

Once the joint-venture was established and the technology selected through the selection of the foreign partner, it was mainly his experience in putting together similar plants in other parts of the world, which was mostly used during the construction stage of the project, including the selection of an international engineer-constructor familiarized with the foreign partner technology, in order to provide the basic engineering design, and to coordinate the detailed engineering procurement, plant erection and start-up, together with local engineering services, always with the approval of the technology owner.

To facilitate the over-all supervision of the project, project managers were assigned for each of the new projects, and each partner provided the technical support, to the extent it was needed and the capabilities they had at that time. Needless to say that in most cases the technological foreign partner was better suited to provide such a technical support.

Once the plant was commissioned, with the total approval of the plant owner (the joint-venture) and the technology owner (the technological foreign partner), the joint-venture entered a third phase, and this was the moment when the private local partner started to gain more importance in the joint-venture.

When the plants start to operate without major mechanical or maintenance problems, which has been the case of most joint-ventures interviewed, then the key problem is on selling the products with a profit margin, to allow the joint-ventures to repay the debts incurred and to give the share-holders a fair return on their initial investments.

In most cases these goals have been achieved by the joint-venture through hiring competent professional personnel to run the different day-to-day activities of the company, under the supervision of a chief executive officer (CEO), normally proposed by the local partner and, in a few cases by PETROQUISA, or the foreign partner. The CEO has to respond to a Board of Directors, with proportional representation of all partners involved. No voting privileges to any particular partner were reported. In only very few cases the foreign partner appointed more key personnel in the joint-venture than the CEO, if any. This few cases were mostly foreign companies in Brazil outside the PETROQUISA system.

It was mentioned before that Brazilian regulatory agencies and official corporations had and presently have a very important role in generating a propitious milieu for the development of the petrochemical industry, with regard to raw material availability, domestic market protection, selling price regulation, export market development, technology development, etc., so it is no wonder that the petrochemical industry in Brazil consolidated for more rapidly and effectively than in any other country in Latin America, including the important aspect of technology adaptation and new technology creation.

The main prime mover of the Brazilian petrochemical industry is presently the consolidation of its present position through efficiency and products diversification and it is here where the local private partner is starting to play a crucial role.

In effect, PETROQUISA is presently trying to diminish its participation in the already established joint-ventures, in order to apply the so liberated human and financial resources in other ventures more oriented to the support to the increasingly technological and human requirements of the Brazilian petrochemical industry.

The foreign partner is taken either an active or passive role regarding the new conditions of the joint-venture; either he is willing to follow the diversification trend, imposed by the changing conditions, or is surpassed by them.

In the last instance, some times decisions were taken by consensus or mutual agreement arrived by negotiation, for the foreign partner to substantially reduce or completely withdraw his participation from the joint-venture. In these cases the local partner has stepped in, taking the foreign investor's shares in the joint-venture.

Several examples on the impact of the dynamic situation of the petrochemical industry of Brazil, over the joint-venture structure can be pointed out, the most significant perhaps are the joint-ventures which initially owned PRONOR, Isocianatos do Brasil and Nitrocarbono. Less visible, but with a far-lasting impact, is the case of Oxiteno which through the consensus of all partners, decided to develop a brand-new line of chemical development, based on own technology developed by Oxiteno research and development efforts, without any involvement of the parent companies technology, and quite far from the original technology which allowed Oxiteno to install and operate its initial plants. In the same independent lines, all the joint-ventures analyzed, marketed their products in the domestic market using their own sales structure, without any participation of the parent companies.

In the international markets a two-tiered approach has been developed: wherever possible and feasible, the joint-ventures have looked for local technical representatives to handle their sales in specific foreign markets. This approach has been developed particularly within Latin America, following similar steps already practiced by Argentine petrochemical exporters. When this approach has not proven feasible, Brazilian petrochemical exports are handled by trading companies, INTERBRAS being by far the most significant. Very seldom the international marketing channels of the foreign partner have been an important factor for the international marketing of the joint-venture products and when used, normally has been on a temporary basis.

It is important to point out that the Brazilian government provided significant incentives to the export of industrial products, in the form of preferred financial terms, which could reach even as far back as financing inventories destined for exports, either directly or through INTERBRAS straight purchase of these inventories.

All executives interviewed agreed upon the convenience of the joint-venture approach in order to develop the petrochemical industry in Brazil, in particular with regard to the participation of the Brazilian government through a technical, apolitical organization such as PETROQUISA. In any case the presence of a local investor as long as he is not a passive shareholder but an active participant, is felt as being highly commendable.

More mixed reactions were obtained with regard to the role of the foreign technological partner. Sometime his participation has been considered highly positive, particularly in those cases where it was thought important to keep an open line for continuous information regarding technological improvements and break-throughs.

Unfortunately, cases existed where the foreign partner was not interested to convey the latest technological advances to a joint-venture where he was a minority partner and he didn't have any control on the marketing of its product. In these cases the most sensible thing done was a negotiated withdrawal of the foreign partner.

The key lesson obtained from the Brazilian petrochemical joint-ventures experience is the highly changeable nature of the business in a dynamic market and hencefore, the need to adapt the joint-venture philosophy and even its structure, to cope with the changing situation.

The three-partner approach developed by the PETROQUISA system has proved to be highly successful with the task of carrying out the big effort in establishing a highly diversified petrochemical industry, in a protected surrounding such as Brazil's, in a fairly short time-span.

For a country without substantial hydrocarbon resources one

tends to think that the Brazilian petrochemical planners have already accomplished a significant objective, using all positive tools available in a very pragmatic and flexible way.

CHILEGeneral Background

Chile has a population of about 11 million people, with a literacy rate of about 95%, per capita Gross Domestic Product of US\$ 1,437 (1982), a small positive trade balance, and an accumulated external debt of about US\$ 19 billion. During the Sixties, the country has a period of substantial economic growth, coupled with political stability and good returns for its main export: copper. This positive situation was capitalized through substantial governmental investment in high technology sectors such as electronics, telecommunications and petrochemicals, among others, through the active participation of a Chilean autonomous economical development agency, CORFO.

Through Chile's active participation in the inception, organization and start-up of the Andean Group Pact (ANCOM), it was possible to negotiate an expanded market for selected petrochemical and other productions originated in Chile.

The ANCOM concept of a common market, was originally developed by five medium and small sized South American countries: Bolivia, Chile, Colombia, Ecuador and Perú (later Venezuela joined in), with the purpose of organizing an economic integration system, with open and free trade among the participant countries, a common tariff barrier against imports coming from third countries and, which was a novel concept at the time (1969), a joint programming of industrial development in selected sectors considered the most dynamic and with higher impact in the participant countries' economy. The petrochemical industry received high priority with ANCOM industrial programming, and in that context, two Chilean official organizations: the Chilean Development Corporation (CORFO), and the National State Oil Company (ENAP), decided to join forces in creating Petroquímica Chilena S.A. as the

working tool to implement a national petrochemical development plan, based on the negotiated expanded market obtained through ANCOM production allocation, through a joint petrochemical development program.

A first stage of this national development plan could materialize between 1967 and 1970 with the commissioning of a small petrochemical complex, based on refinery naphta cracking at Concepción, the main heavy industry region of the country, which included 60,000 MT/year ethylene plant built by ENAP, a caustic-chlorine plant built by Petroquímica Chilena, and a plastic resins production unit built by Petroquímica-Dow S.A., a joint-venture between Petroquímica Chilena, ENAP and the Dow Chemical Company.

Several substantial political changes in the country since 1971, plus Chile's withdrawal from the Andean Group as a consequence of those political changes, freezed any subsequent petrochemical development, at the level attained at 1970. There are some very recent indication towards a possible return of Chile to the Andean Group, but it is too premature to infer any possible impact on Chile's petrochemical activity when this is attained.

Company Profile, Motivations and Objectives

Company : Petroquímica-Dow S.A., PETRODOW
Suecia 281
Santiago, Chile
Tels: 2311406 - 2311884
TELEX: 440109 DQC CZ

Contact : Robert E. Wallace
Executive Vice President

PETRODOW was organized in 1967 as a joint-venture between four partners:

Dow Chemical A.G.	60%
Dow Química Chilena S.A.	10%
Petroquímica Chilena S.A.	20%
Empresa Nacional del Petróleo ENAP	10%
	<hr/>
	100%

The objective of PETRODOW was to build and operate a plastic resins unit, integrated initially by the following plants:

Low density polyethylene (LDPE)	20,000 MT/year
Vinyl chloride monomer (VCM)	18,000 MT/year
Polyvinyl chloride suspension resins (PVC)	15,000 MT/year

These plants were to utilize the latest Dow-owned technologies and in the case of PVC, Dow-acquired technology.

ENAP was responsible with supplying of ethylene to both the LDPE plant and the VCM plant, Petroquímica Chilena was responsible with supplying the chlorine requirements and Dow Química Chilena was organized to market the plastic resins in the Chilean market.

The three plants, together with the raw materials plants, were commissioned almost simultaneously by end-1970, requiring a total investment at the time, of US\$ 31 million, of which US\$ 15 million was represented by the equity anted up by the partners in proportion of their shares, and US\$ 16 million were obtained from international lenders such as Eximbank, Bank of America and the Agency for International Development (AID) as long-term loans guaranteed by CORFO.

During 1976 the LDPE production capacity was expanded to 24,000 MT/year, through debottlenecking, and in 1978, capacity was expanded again to a nameplate capacity of 40,000 MT/year, through minor additions of new equipment.

At the end of 1980, PETRODOW shut-down the VCM-PVC plants in view that new economic conditions prevailing in the country made their operation totally unprofitable.

During 1983, PETRODOW sold about 26,000 MT of LDPE with a total value of about US\$ 24 million. Of these amounts about 30% was exported, mainly to Peru and Ecuador and, to a smaller extent, to the U.S. and Japan.

It is worthwhile to mention that before 1982, when Argentina initiated production of LDPE in the Bahia Blanca petrochemical complex (see corresponding profile) PETRODOW used to export about half of its LDPE production to Argentina, under ALALC-ALADI arrangements.

Critical analysis of the Joint-Venture Elements.

The creation of PETRODOW responded to a well defined petrochemical planning and policies by the Chilean national organization responsible for the economic development of the country, CORFO.

The petrochemical master plan developed by CORFO implied the successive materialization of several petrochemical plants, grouped in production complexes, where the responsibility to produce the basic petrochemicals was to be taken by ENAP or Petroquímica Chilena, created for this purpose as a 50/50 joint-venture between CORFO and ENAP.

Down-stream petrochemical productions, such as the plastic

resins manufactured by PETRODOW, were to be carried-out by joint-ventures between Petroquímica Chilena, foreign technology partners whenever advisable, and Chilean private capital. As a matter of record, the master contract signed between Petroquímica Chilena and Dow for the creation of PETRODOW, have provided for the incorporation of up to 20% of private Chilean investment in the company, through a proportional sales of shares by the charter partners, in the open market. The provision was never carried-out, due to the posterior changes in the Chilean economic policy, during the second half of the 70's, when the application of a tariff barrier of only 10% made quite unattractive the production of petrochemicals in the country.

Dow's interest in the petrochemical joint-venture in Chile was generated by an open invitation placed by CORFO with selected foreign companies which had the technological capabilities and a world-wide experience, in order to participate as partners in the nascent petrochemical industry of the country. Dow was also motivated by the "organization and thoroughness of planning" as well as the opportunity to participate in a "long-term business relationship that is compatible with its business objectives" as a key Dow executive mentioned in a UNIDO symposium held in New York in September, 1969.

Once the master contract was signed in 1968 PETRODOW was established as a separate entity (see in Annex B the listing of chapter headings of the corresponding joint-venture contract).

According with this agreement, Petroquímica Chilena had the right to appoint the Chairman of the Board and Dow nominated the Executive Vice President, who, for all practical purpose, was to be the chief executive officer (CEO) of the new company.

Dow was also empowered with the negotiations with the international engineering company to be responsible to carry out the basic engineering, the detailed engineering, the procurement and the construction supervision. Fish Engineering was selected as general contractor for the project, in view of previous association with Dow, in building low density polyethylene plants, using Dow technology. PETRODOW worked in the organization of the financial package, with Dow support in obtaining the loans from American private banks and with CORFO support in obtaining the loan coming from official lending organizations.

CORFO also helped Dow in obtaining the normal benefits contemplated by the Chilean legislation with regard to foreign investors:

- . Guarantee of access to foreign exchange to convert profits (and eventually capital) for remittance abroad.
- . Guarantee of no increase of the applicable corporate tax rate for a period of 10 years.
- . Duty exemption on imported equipment required in the plants.

Besides, Petroquímica Chilena, developed the technical studies to justify and obtain adequate import duty margins, in order to protect the nascent industry, without dampening the burgeoning Chilean market for the plastics resins to be produced.

Additional measures were taken by Petroquímica and CORFO in order to help the plastic converting industry to obtain easy terms for the purchase of the necessary processing equipment to cope with the increasing domestic resins supply. Some advanced talks were also taking place by Petroquímica's initiative and with active UNIDO participation, in order to create a Chilean Plastics Institute to provide information and technical assistance to the Chilean plastic resins converters.

PETRODOW and Dow signed a know-how contract which allowed PETRODOW to have access to Dow manufacturing technology, through the payment of a lump-sum, capitalized as a certain number of shares in PETRODOW. The contract also included a technical assistance and management clause, to be payed as a running royalty calculated as a percentage of total sales.

The joint-venture contract creating PETRODOW was worked according with a typical Chilean corporate by-laws, with a duration of 99 years, subject to Chilean legislation and establishing the Arbitration Court of the International Chamber of Commerce as the ultimate arbitration instance.

Besides PETRODOW, with the approval of Petroquímica and ENAP representatives in the Board, signed an exclusive distribution agreement with Dow Química Chilena, the commercial agency of Dow in Chile.

PETRODOW initial Board of Directors was integrated by five members: three representing Dow, one representing Petroquímica (corresponding to the Chairman of the Board) and one representing ENAP. Very recently Petroquímica Chilena ceased to exist as a separate entity of CORFO and ENAP and its shares in PETRODOW were split evenly among the two present companies. Therefore, present PETRODOW share holding is as follows:

Dow companies	70%
ENAP	20%
CORFO	10%

The present board has seven members: four representing Dow, two representing ENAP and one representing CORFO. Now, more than ever, overall responsibility on running PETRODOW is in Dow representative's hands.

During the plants construction and the initial years of operation, Dow assigned expatriate personnel as project managers and production managers. Still Dow has the right to appoint the production manager besides the executive vice president of the company, but for several years, the later has been the only expatriate in the company.

Training of personnel has been a top priority item in PETRODOW, using all the facilities offered by the Dow organization worldwide; there are always about 10-15 PETRODOW personnel (out of total payroll of 100) in some training program or another. Also the workers, according to their function within the organization, participate in an incentives program, graduated according to results.

Safety standards at the plant are established according to Chilean industrial safety regulations and the U.S. safety regulations, whichever is stricter. The key raw materials utilized by PETRODOW, were ethylene and chlorine, supplied respectively by ENAP and Petroquímica Chilena, under corresponding long-term contracts.

The ethylene contract for example, originally extended from 1968 to 1981 and was based on a price stick, with an up-and-down tolerance, according to the polyethylene selling price.

The contract was renewed in 1980 for a 10-year period but with a different price basis, this time using as price reference, listed prices in the main international markets, with quaterly revisions.

Chlorine supply contract was based in similar arrangements until end-1980, when the VCM-PVC plants were decommissioned.

Plants operate regularly during their corresponding producing cycles. The polyethylene plant, with a 40,000 MT/year nameplate capacity, have operated at a maximum 37,000 MT/year output, given the present product mix required by the markets. No specific operational

or maintenance problems have been encountered, thanks to a preventive program developed with Dow's help, through the running technical assistance contractual arrangements.

During the first ten years of production (1970-1980) PETRODOW enjoyed an almost uncontested access to the Chilean market of low-density polyethylene and suspension-grade PVC, thanks to a tariff barrier of reasonable level against imports from third countries and more significantly, the plants were capable to maintain a sustained export effort to other Latin American markets, thanks to its early appearance into the Latin American petrochemical scene and the ALALC-ALADI comparative tariff advantages obtained. This was particularly the case of the exports of low-density polyethylene into the Argentine markets until 1981/82.

The situation reversed dramatically during the second half of 1979, when the Chilean economic authorities decided to impose an open market policy based on a free economy managed only through monetary measures. All import duties were reduced to a flat 10% and, which was to have an overlasting effect, the Chilean peso was pegged against the dollar at a fixed rate, disregarding the late effects derived of a previous high inflation situation.

Suddenly the Chilean petrochemical production was unprotected vis-a-vis cheaper imports from elsewhere, and what was also damaging, losing competitive edge in exports, because increasing domestic costs without compensation by a flexible exchange rate.

The VCM-PVC plant had to be closed by end-1980 and the LDPE plant, after having a 100% of domestic market share, dropped to a low 55% during 1982 recovering recently to the present average 70%, thanks to higher import duties and a flexible exchange rate applied recently by the economic authorities of the country.

This is another instance how the petrochemical industry in developing countries is particularly sensitive to macroeconomic policies, due to the intrinsic economic structure of the industry and its relative low capability of adaptation, vis-a-vis sudden changes in an economic environment.

It was a generalized agreement within the majority partner executives, that the Chilean joint-venture was highly successful as it was conceived initially, and this comment is particularly relevant in view of the fact that Dow presently only has 100% controlled operations in other Latin American countries such as Argentina, Brazil, Mexico, Colombia, and that only recently bought a minority participation in a polystyrene plant in Venezuela.

They particularly stressed the high professional level of the Chilean executives who participated in the partnership, and who provided the necessary local technical support required for a smooth start-up and early operation of the joint-venture, in a midst of great political and economical changes in the country, and so avoiding to the extent possible, the political interference in the day-to-day operations of the joint-venture.

One of the few changes which could be suggested from the viewpoint of the local partner, was a greater participation not only in the market decision but more in the actual marketing activity, since presently this is performed solely by the Dow organization both in Chile and abroad, without participation of the joint-venture proper, and therefore missing the possibility of a real transfer of market development technology and marketing know-how to the local partners.

MEXICO

General Background

Mexico has a population of about 75 million inhabitants, with a literacy rate of about 78%, a per capita Gross Domestic Product of US\$ 1.910 (1982), a positive trade balance of US\$ 7 billion (1982) and an accumulated external debt of about US\$ 90 billion.

Mexican economy have experienced a steady growth since the Sixties until the early Eighties, backed by a successful industrialization program carried-out by both Government enterprises and private investors. The free convertibility and fixed exchange rate of the Mexican peso vis-a-vis the U.S. dollar during that period attracted an important influx of foreign investments, and deposits in Mexican financial institutions.

The finding of huge oil deposits by the state oil company, PEMEX by the end of the Seventies spurred a dynamic increase in Government spending, not always with the necessary degree of efficiency, which demanded increasing external financing, generating rapidly the second highest foreign debt in Latin America. The oil prices collapsed by the early Eighties and the subsequent disappearance of easily available external financing, provoked a sudden disruption in the overall economic structure of the country, which only recently is starting to recover.

The heavily indebted industrial sector suffered mostly with the financial crisis, both through the attrition of the domestic market as well as the new burden implied by higher interests.

The Mexican petrochemical industry was severely affected, not

prepared as they were, to cope with changing situations as the Brazilian industry was.

Partly this was due to a quite different structure adopted by the Mexican petrochemical industry since 1960.

In effect, during 1958-1959, Mexican laws assigned to Petroleos Mexicanos (PEMEX) a public, decentralized institution created for this purpose, the sole responsibility in all activities related to the oil industry in the country, including the basic petrochemical industry. During 1960 a specific ruling was approved in order to identify the basic petrochemicals, which production was assigned solely to PEMEX. The list contained the basic olefins and aromatics, ammonia and methanol some important intermediates such as styrene, cumene and vinyl chloride and all polyolefins (polyethylenes, polypropylene).

All the downstream petrochemicals could be manufactured by private companies. Another ruling in 1970 defined the type of private petrochemical companies which will receive authorization to manufacture the most significant down-stream petrochemicals in the country, a basic condition being that at least 60% of the shares have to be in Mexican hands. Since that date and relying mostly in a rapidly expanding domestic market, PEMEX in one hand, and Mexican private investors together with foreign technology partners in the other, started to build a burgeoning Mexican petrochemical industry.

Not always there existed a good synchronization between PEMEX commissioning of basic and intermediate petrochemical plants, and private industry building of the down-stream plants, so PEMEX had to import the necessary products to fill the gap.

On the other hand, as soon as enough capacity was built to supply domestic market in any kind of petrochemicals, no further import

permits were authorized so, for all practical purposes the Mexican markets were quite protected from outside production and selling prices could be settled according to the market acceptance. Generally speaking, PEMEX's transfer prices for basic and intermediate petrochemicals were historically around or below the international price levels but private industry pricing has been 20% or more than international prices.

Additional incentives were given to private petrochemical industry between 1978 and 1982, if they were willing to locate new production capacity in selected plant sites, close to the newly discovered oil and gas fields, and far from the heavily industrialized and polluted urban zones.

The main incentive was a 30% rebate on the cost of petrochemical raw materials and fuels supplied by PEMEX during a certain period of time, as long as the new industries were to export at least 25% of their name-plate capacity, in an annual basis, during the same period.

Several of the existing private petrochemical industry made good use of this incentive, as well as discussed later.

Due to Mexico financial crisis of 1982, all petrochemical development, both public and private reached a standstill, and the producing companies entered a period of re-evaluation and reorganization of plans and structures. As a matter of fact domestic demand for most petrochemicals has fallen since the all high 1981 level and it is not expected to recover its former level before the second half of this decade.

New investment have been postponed until the end of the decade and only PEMEX has indicated its intention to complete the installation of important on-going petrochemical complexes.

The joint ventures analyzed in greater detail represent the 60/40 arrangement according with the present governmental rulling as well as a few cases of joint-ventures among joint-ventures.

The representing joint-ventures are:

- . Polioles S.A.
- . Nylon de Mexico S.A.
- . Fibras Químicas S.A.

These three companies are joint-ventures belonging to the ALFA Group.

- . Celanese Mexicana S.A., a joint-venture formed by Celanese Corporation (40%) and the Mexican individual investors (60%).
- . Industrias Resistol S.A., a joint-venture formed by Monsanto Co. (40%) and a private Mexican holding company plus private investors.
- . Fenoquímica S.A., a 50/50 joint-venture between Celanese Mexicana and Industrias Resistol
- . Policyd S.A., a joint-venture belonging to the CYDSA Group.
- . Instituto Mexicano del Petróleo (IMP), the planning and engineering arm of PEMEX.

Company Profiles, Motivations and Objectives

- 1.- Company: Polioles S.A.
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06140 México, D.F., México
Tel: (905) 553-8811
TELEX: 01772662

Contact: Ing. Francisco Garza
 General Director

Poliolles was organized in 1962 as a 100% private Mexican company in order to produce propylene glycol and polyols from imported propylene oxide. Initial combined capacity was close to 4,000 MT/year. Later Wyandotte Chemicals entered as a 40% technology partner and a 7,000 MT/year ethylene glycol was built in 1968.

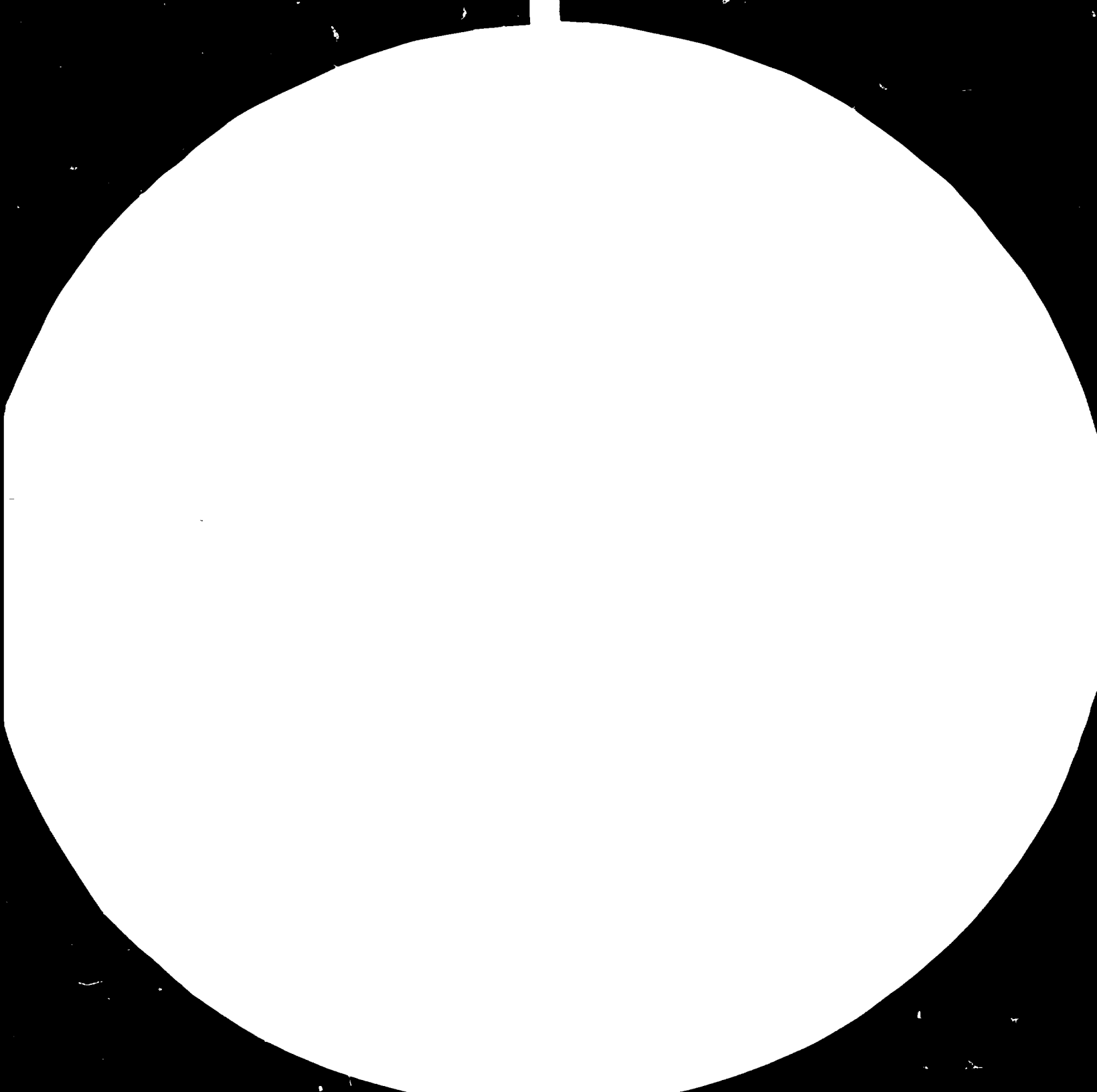
BASF from the Federal Republic of Germany bought Wyandotte Chemicals in 1970 and in 1973 production capacity was expanded to 23,000 MT/year of ethylene glycol and 15,000 MT/year of polyether polyols.

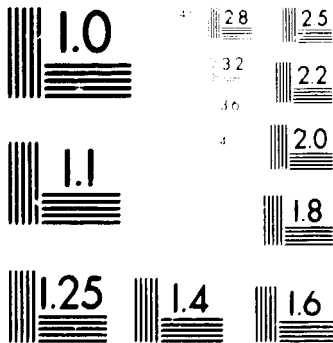
In 1976 the ALFA Group, at the time one of the most important private industrial holding in the country, bought the 60% Mexican interest in Poliols and injected fresh capital into the company, allowing a substantial expansion of the production capacity between 1979 and 1981 in the same plant site (Lerma, State of Mexico), allocating about US\$ 20 million for that purpose.

Present Poliols installed capacity is as follows:

Ethylene glycol (fiber grade)	65,000 MT/year
Polyols for polyurethanes	22,000 MT/year
Polystyrene (expandable grade)	12,000 MT/year
Glycol derivatives	44,000 MT/year

Raw materials are supplied partly by PEMEX (ethylene oxide, styrene monomer, methanol) and partly is imported (propylene oxide). Technology for the latest expansion was supplied by BASF.





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Annual invoicing is in the order of US\$ 80 million equivalent to 90,000 MT of sales, 85% of which correspond to domestic sales and 15% to export to the U.S., Japan, Argentina and Venezuela.

Due to present market uncertainties, no new expansion plans are being considered by the joint-venture, which presently is formed by:

Grupo ALFA	60%
BASF (West Germany)	40%
	<hr/>
	100%

2.- Company: Nylon de México S.A.
Apartado Postal 800
Monterrey, N.L., México
Tel: 48-60-00
TELEX: 038690

Contacts: Ing. Rubén Acevedo
Manager, Planning and Systems

Ing. Juan Pablo Legarreta
Planning and Development

Nylon de México was established as a 100% Mexican private company in 1958, to produce nylon fibers. Later on, the Mexican group formed a separate joint-venture with Du Pont, in order to produce polyester fibers with Du Pont technology. Both companies were joined in 1974 as Nylon de México, and in 1975 ALFA Group bought the shares of the Mexican partner, so forming the present joint-venture structure:

Grupo ALFA	56%
Du Pont	40%
Other investors	4%
	<hr/>
	100%

Nylon de México present installed production capacity is as follows:

Polyester polymer and fibers:

. Polyester polymer (PET), fiber grade	27,000 MT/year
. Polyester fibers and filament	30,000 MT/year

Nylon 6 polymer and fibers :

. Nylon 6 polymers	7,200 MT/year
. Nylon 6 filament and staple fibers	11,500 MT/year

Spandex fibers (Lycra) 650 MT/year

All these plants are located in Monterrey.

Lycra was one of the latest plant additions to Nylon de México and is the first known case where Du Pont is not the sole owner of it, being a very special technological development of this multinational chemical company.

3.- Company: Fibras Químicas S.A.
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 Monterrey, N.L., México
 Tel: 48-00-00
 TELEX. 03869

Contacts: Ing. Rubén Acevedo
 Manager, Planning and Systems

 Ing. Juan Pablo Legarreta
 Planning and Development

Fibras Químicas was established around 1959 as a joint-venture between the predecessor company of AKZO NV, The Netherlands and a private Mexican chemical holding: Grupo CYDSA, in order to establish polyester fiber and nylon 6 fiber production facilities in Monterrey, México, using AKZO technology.

During 1977, through a complicated share swapping deal, Grupo ALFA replaced CYDSA as the local partner in Fibras Químicas, so present ownership in the joint-venture is as follows:

Grupo ALFA	60%
AKZO N.V.	40%
	<hr/>
	100%

Present production capacity in Fibras Químicas is as follows:

Polyester polymer and fibers:

- | | |
|--|----------------|
| . Polyester polymer (PET), fiber grade | 37,000 MT/year |
| . Polyester filament yarn | 20,000 MT/year |

Nylon 6 polymer and fibers:

- | | |
|-------------------------------|----------------|
| . Nylon 6 polymer | 20,000 MT/year |
| . Nylon 6 textile filament | 5,700 MT/year |
| . Nylon 6 industrial filament | 8,500 MT/year |

Taking into account that since 1977 ALFA is majority partner in both synthetic fiber joint-ventures, and that both production facil-

ities are located in Monterrey, ALFA decided the same year to organize an administrative group to handle both joint-ventures: AKRA. They could not manage a fusion of both joint-ventures because of the disparity of foreign partners, but from the commercial viewpoint both joint-ventures operate quite in closely coordination: one plant supply excess polymer intermediates to the other, and domestic sales and exports of both plants in nylon and polyester products are made through the AKRA organization.

Both joint-ventures utilize main raw materials supplied by petrochemical plants located elsewhere in Mexico:

For polyester production, the supplier of dimethyl terephthalate (DMT) and terephthalic acid (TPA) is PETROCEL S.A., another petrochemical joint-venture of ALFA; the fiber-grade monoethylene glycol is supplied by POLIOLES S.A. (see corresponding profile).

For nylon 6 production, the caprolactam supplier is Univex S.A., a Mexican petrochemical joint-venture where some nylon producers such as Nylon de México and Celanese Mexicana are principal partners, together with the technology provider: DSM of the Netherlands.

AKRA's total sales of synthetic fibers were in the order of 65 - 70.000 MT during 1983 of which about 20% was exported, including polyester polymer and staple fibers to South America, polyester filament to China, U.S.A. and Canada; textile nylon for apparel to Central and South America, nylon for carpets and nylon for industrial use to the U.S.A.

Due to the depressed situation of the Mexican textile industry since 1981-1982 AKRA does not have any significative expansion plan in any of the two joint-venture companies.

As a matter of record, Mexico's main exports in the synthetic textile sector is not in the form of polymers or fibers, but in the form of the intermediate DMT. PETROCEL, the sole producer of DMT in the country has a DMT capacity of 242,000 MT/year. During 1983 the plant produced 150,000 MT of which 75,000 MT was consumed domestically and about 75,000 were exported to more than 14 countries and representing by far the most important DMT producer and exporter in Latin America and perhaps in the world. PETROCEL is a joint-venture of 60% Grupo ALFA and 40% Hercules, which supplied the production technology.

The ALFA Group not only has invested heavily in petrochemical production, exclusively through joint-ventures with technological foreign partners, but also is involved in iron ore and steel production, pulp and paper products, capital goods, foods and real estate. Before the financial crisis of 1982 which affected severely the Group, its total assets placed the industrial holding as the biggest private group in Latin America.

4.- Company: Celanese Mexicana S.A.
Av. Revolución N° 1425
01040 México D.F., México
Tel: (905) 548-6960
TELEX: 01772431 CELAME

Contact: Ing. Guillermo López Mellado
Director, Fibers Division and International
Marketing

Celanese Mexicana is presently the biggest private petrochemical company in Mexico with six complexes and 42 producing plants located in 10 different production centers all through Mexico.

The most important investment is in La Cangrejera, Veracruz State where Celanese invested between 1980 and 1982 over US\$ 300 million in a grass-root petrochemical complex, in order to produce the following petrochemical intermediates:

Acetic acid	108,000 MT/year
Acetic anhydride	35,000 MT/year
Vinyl acetate	25,000 MT/year
Butyraldehydes	90,000 MT/year
Acetone	60,000 MT/year
Methyl amines	8,000 MT/year
Dimethyl formamide	6,000 MT/year

These intermediates are utilized in other Celanese Mexicana plants or by other Mexican producers, to manufacture down-stream products. Also significant amounts are exported, to comply with the petrochemical incentive regulations, under which this complex was built (see General Introductio.).

Older Celanese Mexicana plants and complexes are oriented to the production of all kind of synthetic fibers (cellulosics and man-made), petrochemical monomers, intermediates and solvents, and plastics resins and films.

The company was born in 1944 as a joint-venture of Mexican entrepreneurs and Celanese Corporation of the U.S., with the purpose of producing cellulose acetate filament fiber in Mexico. This early joint-venture was around 50/50 Mexican/foreign participation. Celanese was to supply the necessary technology to manufacture synthetic textile fibers within the company.

Early during the Sixties another joint-venture, Química General, was incorporated, with the purpose of manufacture petrochemical intermediates such as acetic acid, acetic anhydride and acetone, which were required in the fiber manufacturing operations of Celanese Mexicana. Química General was formed under a similar 50/50 arrangement with private Mexican capital and Celanese Corp.

When the Mexican Petrochemical Law was established in 1970, both joint-ventures fused into a new Celanese Mexicana S.A., where Celanese Corporation retained 40% of the shares and the remaining 60% was acquired by former Mexican investors and the Mexican public.

During 1980 the company was reorganized in the present three manufacturing divisions:

- Fiber Division
- Chemical Division
- Plastics and Specialities Division

During 1983 total company sales reached over US\$ 350 million

Industrias Resistol was constituted in the late Sixties as a joint-venture according to the Mexican legislation, by the amalgamation of a Mexican chemical company by same name and the Monsanto Co. operations in Mexico. The resultant joint-venture had initially the following equity participation:

Monsanto Co. (U.S.A.)	:	40%
Former owners of Industrias Resistol	:	60%

This fusion implied the joining of the operations of the: parent companies, under the new organization. These included among other, the following productions:

- . Polyvinyl chloride resins in different types (PVC resins)
- . Phosphoric acid and phosphates (technical and food grades)
- . Synthetic adhesives and paints (industrial and domestic use)
- . Formaldehyde and formaldehyde resins and adhesives
- . Polystyrene resins and styrene copolymers

Later on, a Mexican investment group, DESC, was organized according to Mexican regulations, in order to invest in industrial activities in the country. Among other investments, DESC bought a significative package of the Mexican shares in Industrias Resistol, being presently the biggest shareholder in the company. This fresh capital injection, plus sustantial external loans, allowed Industrias Resistol to participate in different new petrochemical projects under different joint-ventures, the most significant being FENOQUIMIA S.A., a 50/50 joint-venture organized together with Celanese Mexicana and which will be analyzed in detail. The consolidated sales of Industrias Resistol in 1983, including those coming from FENOQUIMIA reached a figure in the order of US\$ 250 million, of which about 10% corresponded to exports.

The company policies for the next years are oriented to the completion of present on-going project, and to the debottlenecking of present installations. No investments in new projects are being contemplated due to the attrition of domestic sales for some products manufactured by the company, which are oriented to recession-sensible areas such as the construction sector.

6.- Company: Fenoquimia S.A.
Bosques de Ciruelos N° 99
11700 México, D.F., México
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TELEX: 0177729

Contact: Ing. Leopoldo Rodríguez S.
General Manager

Fenoquimia was born in 1964, initially as a 100% Industrias Resistol venture, with the purpose of building a phenol plant in Mexico.

During the process of selecting the proper technology to be utilized in the plant, PEMEX decided to build a cumene plant, an important petrochemical intermediate for the co-production of phenol and acetone, the cumene route being by far the most efficient to obtain both petrochemicals.

Being Industrias Resistol interested in phenol, and Celanese Mexicana interested in acetone, the joining of forces in a common project seemed a logical decision, and in 1972 Fenoquimia was formed as a 50/50 joint-venture between the two companies which, as it was already indicated, are also petrochemical joint-venture. The initial Fenoquimia project was the installation, between 1973 and 1976, of the following petrochemical production facilities in Cosoleacaque, State of Veracruz:

- . A Phenol-Acetone plant based on cumene as raw material with the following production capacity:

- Phenol	25,000 MT/year
- Acetone	15,000 MT/year

- . A Methyl Metacrylate monomer plant : 12,000 MT/year
- . An Acetone Cyanohydrin plant : 15,000 MT/year
- . A sulphuric acid recovery plant

Total initial investment required was about US\$ 30 million.

Later on in 1982 the methyl metacrylate (MMA) plant was expanded to 18,500 MT/year and a new crude acetone cyanohydrin plant, with 20,000 MT/year capacity was built in another location: Tula, State of Hidalgo, representing an additional investment of about US\$ 12.5 million.

Until 1982 the cumene raw material required in the co-manufacture of phenol and acetone, was imported. Since that year cumene is available from PEMEX petrochemical facilities at the nearby La Cangrejera.

The MMA plant utilizes the acetone cyanohydrin produced by Fenoquimia at the same plant site as well as that coming from Tula, as the main raw material. Additional raw materials: methanol and sulphur for sulphuric acid production are supplied by PEMEX.

The acetone cyanohydrin manufacturing required hydrogen cyanide, obtained as by-product of acrylonitrile production by PEMEX and acetone produced by FENOQUIMIA. The principal bottleneck has been in the supply of hydrogen cyanide for a regular operation of the

corresponding facilities at Fenoquimia. As a consequence, 1983 production and sales of marketable products, has been the following:

Phenol	: 23,300 MT
Acetone for sale	: 6,800 MT
MMA	: 11,600 MT

Out of this production, the following amount was oriented to the export markets:

Phenol	: 6,100 MT
Acetone	: 1,000 MT
MMA	: 3,200 MT

All these exports have been handled through Industrias Resistol marketing organization.

The manufacturing processes utilized by Fenoquimia are the following:

Phenol-Acetone	: B.P. Chemicals (U.K.)
Methyl Methacrylate	: ICI (U.K.)
Acetone Cyanohydrin (Cosolecaque)	: ICI (U.K.)
Acetone Cyanohydrin (Tula)	: Mitsubishi Chemicals (Japan)

7.- Company: Policyd S.A. (Grupo Cydsa)
Apartado Postal 1124
Garza García, N.L., México
Tel: 76-50-20
TELEX: 038801

Contacts: Ing. Iván Becka
 Vicepresident, Chemical Division
 Cydsa Group

Policyd was born in 1953 under the name of Geon de México, as a joint-venture of Goodrich Chemicals Co., of the U.S. with another joint-venture between Goodrich and Spanish investors, already operating in Mexico in the rubber sector.

Geon was created with the purpose of polymerize imported vinyl chloride monomer into polyvinyl chloride resins (PVC), using Goodrich technology.

The 1970 government regulations concerning the Mexicanization of down-stream petrochemical production, faced Geon de Mexico to look for a change in the ownership structure. During 1971 an understanding was reached with the Cydsa Group, a Mexican chemical company already involved in the production of a variety of petrochemicals, fibers and films, either directly or through joint-ventures. Both Goodrich and Cydsa agreed upon a long-term development plan and Cydsa bought out the Spanish and Mexican shareholders, taking a 60% equity in the re-organized company. B.F. Goodrich of the U.S. kept the remaining 40%, according to the Mexican regulations concerning petrochemical joint-ventures.

As a first movement the company changed the name into Policyd and decided to freeze present PVC production capacity in La Presa, Federal District of Mexico, at 40,000 MT/year and to look for a new location elsewhere.

The industrial development program of 1978 came quite in hand, in order to decide for a new plant site at Altamira, Tamaulipas, close by the port of Tampico, one of the areas allocated by the government for new petrochemical development, in order to be recipient of the special incentive package already discussed.

There Policyd built a new PVC resins production facility of 72,000 MT/year of suspension grade resins. The plant entered production in 1981, using the latest Goodrich polymerization technology.

The main incentive received by the plant is the availability to obtain vinyl chloride monomer at a 30% price rebate from PEMEX, as long as the plant exports at least 25% of its name-plate capacity on an annual basis, i.e. 18,000 MT/year during a period of five years.

During 1983 Policyd exported 32,000 MT of PVC resins, out of a total sales of 80,000 MT coming from the production of the two plants.

8.- Organization: Instituto Mexicano del Petróleo (IMP)
Eje Central Lázaro Cárdenas N° 152
Delegación Gustavo A. Madero
07730 México, D.F., México
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TELEX: 01773116

Contacts: Ing. José Luis García Luna
General Director

Ing. José Luis de las Fuentes
General Director for Marketing

Ing. Fernando Mitre
Manager, Industrial Planning

IMP was created by PEMEX by the mid-Sixties to act as the technical development and engineering support arm for PEMEX and, eventually, for other Mexican petrochemical producers.

Presently 90% of IMP revenue is derived from PEMEX contracts, mostly with regard to oil refinery and basic petrochemical production technology, and with the contracting of engineering services for refinery and basic petrochemical plants design. PEMEX is quite selective in deciding which technology wanted to be developed in Mexico by IMP, and which technology is going to be purchased abroad.

It was already mentioned that since 1960 Mexican law and petrochemical regulations gave PEMEX the right to be the sole producer of the so defined first conversion petrochemicals which, for all practical purpose includes all basic petrochemicals, the most important intermediate petrochemicals, and some down-stream petrochemicals, such as all polyolefins.

The important aspect to underline has been the fact that PEMEX has not found any particular difficulty to negotiate the transfer of the required production technologies for all its petrochemical developments, through the straight purchase of them and without the recourse of forming joint-ventures, a scheme which eventually could be utilized in some very specific cases.

Between 1964 and 1983, PEMEX commissioned under its sole ownership, about 120 different petrochemical plants, which during 1983 produced over 10 million tons of petrochemicals.

Of this total, a little over 800,000 MT were exported, with a revenue close to US\$ 125 million. The same year PEMEX imported petrochemicals to be sold in the domestic market, with a US\$ 336 million value.

Domestic sales value of petrochemicals produced by PEMEX reached about US\$ 750 million.

These figures are heavily influenced by the production and transfer sales of very basic petrochemicals such as ammonia, carbon dioxide and ethane.

Present petrochemical projects in the engineering and construction stage, involved the completion of a huge petrochemical complex at La Cangrejera, State of Veracruz, a new propylene-based complex at Moreios, State of Veracruz, and a new chloride derivatives complex at Pajaritos, Veracruz.

Main new petrochemicals to be produced included:

Low density polyethylene	240,000 MT/year
Ethylene	500,000 MT/year
Propylene	350,000 MT/year
High density polyethylene	100,000 MT/year
Polypropylene	100,000 MT/year
Vinyl chloride monomer	300,000 MT/year
Acrylonitrile	50,000 MT/year

Critical Analysis of the Joint-Venture Elements.

Again like in Brazil, external conditions and regulations have determined the type of ownership structure of the petrochemical joint-ventures in Mexico and, moreover, have limited the area where the joint-ventures can participate.

It is also significant that in several instances, petrochemical companies were already established in Mexico before the 1970 regulations on the type of joint-ventures allowed to participate in the petrochemical development of the country, so those companies had to modify their ownership structures, sometimes quite significantly, in order to comply with the new regulations.

In certain cases the amalgamation of a foreign-owned company with a Mexican company was the road chosen (Industrias Resistol). In other instances it was necessary to sell shares in the Mexican open market in order to reduce foreign ownership to the 40% limit (Celanese Mexicana). Finally fresh Mexican capital have been injected to chemical companies through the participation of one of several industrial holdings formed in Mexico, during the last 10-15 years, (ALFA Group, Cydsa Group, etc.) through the purchasing of the 60% share corresponding to the Mexican participation in the petrochemical joint-ventures.

The Mexican majority participation in the petrochemical joint-ventures analyzed have reflected also in the management structure.

In all cases analyzed, management of the joint-ventures rested in Mexican professionals, appointed by the Mexican partner and with full responsibility and accountability of a chief executive officer (CEO). The only exception found was the case of Celanese Mexicana where the management is in the hands of Mexican professional managers, involved with the organization for many years, so they were originally appointed by the foreign partner, Celanese Corporation.

No joint-venture analyzed has any specific different arrangement with regards to profit-sharing, options on shares or other forms of ownership, outside of those derived from the corresponding participation in the equity capital.

The key different elements are the on-going technical assistance contracts signed between the Mexican joint-venture company and the foreign partner which supplied the original technology, under which the petrochemical facilities were built. These are the cases for instance of the technical assistance contracts signed between:

- . Polioles and BASF
- . Nylon de México and Du Pont
- . Fibras Químicas and AKZO
- . Celanese Mexicana and Celanese Corp. (only for some productions)
- . Polycyd and Goodrich

In all these cases analyzed, the technical assistance contract recognized the foreign partner an annual fee, generally calculated as a percentage of sales, as a compensation for the availability of technical information and technical personnel from the foreign partner, in matters related with plant operation and maintenance, and technology improvements which can be utilized by the joint-venture. This running fee is different from the dividends distributed out of profits from the joint-venture operations.

There are also cases where the joint-venture contracted some specific management and administrative services with the Mexican parent company, as it is the case of all ALFA Group affiliated companies with respect to the Administrative Center located in Monterrey. The fee in this case is also expressed as a percentage of sales.

Once a fee is paid or a dividend is declared by the joint-venture in Mexican pesos, it is the responsibility of the foreign partner to obtain the Mexican monetary authorities, the conversion of the pesos into the corresponding foreign currency for its remittance abroad. This instance only started to exist since 1982. Before that date, Mexico had a free convertibility policy.

Purchases of raw materials required by the joint-ventures had to be done with PEMEX for all petrochemicals produced and imported by this organization.

For those raw materials still not produced in Mexico, the joint-ventures are free to purchase them from the most convenient supplier, as it is the case of the propylene oxide utilized by Polioles. The only limitation is the import permit which has to be justified with the corresponding Mexican regulatory authority, before imports are allowed into the country.

The pricing policies on the products manufactured by the joint-venture are established by the corresponding Board of Directors, as recommended by the CEO, with the limitations established by domestic competition, when it exists, and by the absorptive capability of the Mexican markets. When pricing conflicts have appeared between some petrochemical joint-venture and the clients, the Mexican government Commerce Department has intervened as arbitrator.

Nevertheless, the main government participation in the joint-venture activities has been the establishment of a very well defined framework and regulations system regarding the joint-venture structure, area of action and protection through the establishment of import licenses to competitive products.

In the organization of the Board of Directors of the joint-venture companies, the representation of the partners are always in proportion of their shares, and the Chairman of the Board is generally a Mexican partner appointee.

The CEO is also nominated by the Mexican partner, but subject to the approval of the foreign partner Board representatives. On the other hand, the foreign partner generally has the privilege to appoint a key technical officer in the joint-venture, subject to the approval of the CEO. Sometimes he is the technical director; in other cases he is the quality control manager as in the case of fiber-producing joint-venture companies.

New projects within existing joint-venture companies, as it has been normally the case with the organizations interviewers (the new La Cangrejera complex of Celanese Mexicana, the new PVC plant of Policyd, the expansion of Polioles, etc.), are managed by the engineering departments of each company. Only in the case of Fenoquimia the situation was different.

In this case, both partners (Industrias Resistol and Celanese Mexicana) jointly defined the whole of Fenoquimia project and then, within Fenoquimia a project team was organized to carry-out the materialization of the project. Very early in the project schedule, both partners formed together a technical committee, to supervise and orient Fenoquimia project management team. In spite of the supervision exercised by the partners, both with long-term practice in project management, the independent project management team could not or would not make good use of such expertise, and the partners capabilities was not utilized in the day-to-day project management, with the previsible consequences in the loosing of investment cost controls.

The same problem appeared during the first years of the plants operations by Fenoquimia due to the lack of experience of the independent management appointed. After a couple of years of operating problems, a consensus was reached among the partners to give to one of the two, in this case Industrias Resistol, the management responsibility of the joint-venture and things immediately improved.

Also Resistol took the responsibility of handling the marketing of the products manufactured by Fenoquimia, with the exception of the domestic marketing of acetone, which was Celanese Mexicana's responsibility.

Before 1982, financing for new petrochemical projects within existing joint-ventures could be early arranged through long-terms

loans, plus the deferment of corporate taxes as a fiscal incentive granted by the Mexican government. At the present time, Mexican financial authorities key concern is in helping the reorganization of the industry heavy foreign debt, as an immediate priority task, due to the burden it places in the regular operation of most of the Mexican petrochemical industry.

The workers in the petrochemical industry in Mexico have their own union and have obtained profit-sharing benefits, but do not participate in the management decisions, which are under the management system already analyzed.

The raw materials used by the down-stream petrochemical companies are mostly supplied by PEMEX, based on an agreed-upon annual quantity to be delivered on a monthly basis. No contractual arrangement ties PEMEX and its clients and raw material prices are readjusted periodically to cope with the inflation process already existing in the country, albeit if in dollar equivalent, they are similar or lower than competitive international prices.

The cost increases in Mexican pesos in the raw materials are transferred to the products manufactured by the joint-ventures, where prices are in general 20% or higher than international prices. As a result, operational profits by the Mexican petrochemical industry are satisfactory, until financial costs are taken into account. Export incentive installed capacity and therefore diminish fixed costs, as well as a means to generate needed foreign exchange. This recent action taken by the petrochemical joint-ventures is over the export levels already compromised for those plants recently built under the 1978 petrochemical development law discussed before.

The most important incentive for exports in these cases, has

been the 30% price rebate offered by PEMEX on the raw materials supplied. Besides, the Mexican government provides, under certain conditions, export certificates which can be applied against corporate taxes. As a general rule, the export markets were developed by the joint-venture proper, sometimes using initially the international marketing channels already established by the foreign partner, but later on, the joint-ventures have developed their own marketing channels, particularly within Latin America, through local representatives. Because of the relative distance and transportation costs, Mexico has not been until now, such an active partner in the ALALC-ALADI inter-regional trade as Argentina or Brazil are, so the United States of America has been a preferred trading partner for most of the petrochemicals either produced or imported by Mexico and that also included the significant PEMEX foreign trade on basic petrochemicals.

After sales services, are not normally provided to Mexican petrochemical customers abroad, due to distance and other problems involved and, as a general rule, the Mexican producer prefer to compete on prices and not so much on services.

The existence of well defined ground rules for the participation of Mexican capital and foreign capital in the operation of the Mexican downstream petrochemical industry, coupled with the availability, present or potential, of the basic petrochemical raw materials allocated to PEMEX, plus a substantial and dynamically growing domestic market favored the formation of successful joint-ventures, where the local partner was either an established industry or a new, diversified industrial holding which took the responsibility to ante up the 60% Mexican equity in the joint-venture, as well as its administration.

The foreign partner role was in most cases restricted to the supply of the required production technology (normally capitalized in the corresponding equity), the on-going supply of technical assistance

based on a running royalty, and in some cases the appointment of one or maybe two expatriate technical personnel to manage specific aspects of production and/or quality control.

Main problem areas faced presently by the joint-venture companies operating in Mexico are mostly external in nature, generated by the attrition of the domestic markets and the heavy burden placed by foreign debt and present credit and foreign exchange restrictions. Internal problems, at least from the viewpoint of the Mexican partner, have been relatively minor in nature, and in most cases related with disagreements in proposed diversification programs or in the actual valuation of technical assistance, or in restrictions of access to improvements on the technology provided by the foreign partner. These aspects changed very much according to the philosophy and policies adopted by the chemical multinational companies, which participate in the petrochemical joint-ventures in Mexico, and these aspects are not regulated by joint-venture structures or even technical assistance contracts, but they tend to reflect attitudes and international interests of the multinational companies.

So as a main conclusion, when management capabilities already exist in the local partner, the selection of the technological foreign partner has to include not only the merits of the production technology thought after, but also a frank discussion on the long-term objectives of the joint-venture and the flexibility in approach that the foreign partner is like to provide, in reaching those long-term objectives.

VENEZUELA

General Background.

Venezuela has a population of close to 15 million inhabitants, with a literacy rate of 88%, a per capita Gross Domestic Product of US\$ 2,540 (1982), a positive trade balance of over US\$ 2,5 billion per year, and an accumulated external debt of about US\$ 35 billion.

Oil has been the basic pillar where the country economy has rested since the Fifties, contributing to over 60% of total export revenues during the last decade, and allowing Venezuela to reach one of the highest per capita income among the Latin America countries.

Substantial exports surpluses generated by oil, historically allowed the country to import industrial raw materials and consumer goods without restrictions, and to maintain a foreign exchange freedom and financial openness for over 20 years.

Substantial government investment in infrastructure and basic industrialization of the country during the second half of the Seventies, generated an increasing amount of long-term indebtedness.

This government investment was committed in long-term projects which in many cases had yet to start generating revenues to pay for the debts, when the fall in the external oil demand appeared in 1982. The combined fall in oil and fiscal revenues, coupled with difficulties to obtain additional short-term loans to surpass the monetary crisis, which was compounded by private capital outflight, generated an immediate stop of all investment and a standstill of the economic growth of the country.

The newly elected government has to place more restricted

foreign exchange controls over those imposed by the salient government, as well as initiate the renegotiation of the foreign debt.

All this newly experienced situation, makes quite difficult to forecast the medium term impact in the Venezuelan industrial sector and particularly in the petrochemical sector, due to the sensitiveness of the Venezuelan economy to changes in the external sector and the heavy burden placed by the external debt.

The petrochemical development of the country have experienced two quite different phases in the past.

Due to the ample supply of oil and gas resources that the country is endowed, by the mid-Fifties, the government started to built a state-owned petrochemical industry, through the specifically created Venezuelan Petrochemical Institute (IVP).

IVP built and operated a fertilizer chemical and petrochemical complex at Moron, State of Carabobo and in 1966-1967 started to develop a petrochemical complex at El Tablazo, State of Zulia, based on a 150,000 MT/year ethylene core unit to be built and operated by IVP, and by the installation of down-stream petrochemical plants to be built and operated by joint-ventures organized by IVP and with IVP participation.

Several petrochemical joint-ventures were organized by the end-Sixties for that purpose among them:

. Estireno del Zulia, ESTIZULIA (Polystyrenes)	
IVP	37,5%
Grupo Zuliano (a Venezuelan private holding)	37,5%
The Dow Chemical Co. (U.S.A.) previously was	
Dart Industries	25,0%

. Polimeros del Lago C.A., POLILAGO (low density polyethylene, LDPE)

IVP	40%
Grupo Zuliano (a Venezuelan private holding)	30%
CdF Chimie (France)	30%

. Química Venoco (Propylene tetramer - Dodecylbenzene)

IVP	15%
Industrias Venoco	15%
Shell Química de Venezuela	15%
Phillips Investments Co.	15%

These examples are indicating that the general ground rule for joint-venture equity formation was a majority of Venezuelan capital.

Due to a history of project mismanagement, most of the petrochemical plants under IVP had costly overruns and operating problems. For example the El Tablazo ethylene plant project was initiated in 1966-1967, but was finally commissioned, in 1976 after years of construction and extensive rebuilding, and only in 1979 started normal operation.

In January 1976, the Venezuelan government took a long-programmed decision in order to nationalize all oil operations in the country, which before that date, were run by international oil companies.

To represent the government interests in the different nationalized operations, a state-owned holding was created: Petróleos de Venezuela S.A. The oil operating companies: Lagovern, Maraven, Corpoven, etc., were organized along the lines and using similar structures, administrative and personnel, than those established by previous owners, and also keeping similar efficiency goals.

In 1978, Petróleos de Venezuela absorbed the petrochemical assets of IVP, after a profound reorganization of all its operations in order to diminish loses, and formed another 100% controlled operating company to run and represent the Venezuelan State in the petrochemical activities of the country: PEQUIVEN -Petroquímica de Venezuela S.A., under similar efficiency goals of the other companies within the holding.

Presently PEQUIVEN, as the petrochemical operating arm of Petróleos de Venezuela is running previous operations developed by the now defunct IVP.

In a parallel way, private companies in Venezuela started the development of other petrochemical productions, based on imported raw materials. In these cases, the government supported the development efforts, mainly through tariff incentives by establishing fairly high import duties on equivalent products to those manufactured in the country and, at the same time by exonerating the applications of import duties on imported raw materials.

Under the mechanism, separated down-stream petrochemical productions were established in the country, mainly by private entrepreneurship such as polystyrene, phtalic anhydride, carpolactam, polyols and similar petrochemicals. Sometimes, PEQUIVEN has participated as minority partner in the joint-ventures formed to handle these productions, mainly to facilitate the application for some fiscal incentives to the newly-formed venture.

Since 1974, Venezuela is an active member of the Andean Pact Group (ANCOM), joining Bolivia, Colombia, Ecuador and Peru in a joint petrochemical development program, which allocated to Venezuela the manufacturing of high density polyethylene, styrene, and synthetic rubbers among other petrochemicals, and giving access to the markets of the other member countries, the existing petrochemical production in

Venezuela. Due to the higher degree of petrochemical development attained by the country in comparison to that of the other member countries, Venezuela has already made good use of ANCOM arrangements, as different of Chile, which withdrew from ANCOM in 1976 as it was explained before.

The establishment of the government petrochemical production under the umbrella of Petróleos de Venezuela, competing for the same budget allocations with the nationalized oil companies, the active participation of Venezuela in the petrochemical planning within ANCOM, and the sobering fact of high investment costs required by capital-intensive industries such as the manufacturing of petrochemicals, have obliged Petróleos de Venezuela to substantially revise the development plans thought initially by IVP reducing substantially the scope of projected production and downsizing the plants to accessible markets, such as those provided by ANCOM.

Therefore, outside of a recently commissioned high-density polyethylene plant, oriented to the ANCOM markets, and operated under a joint-venture with PEQUIVEN participation immediate plans are concentrated in the production of other petrochemicals allocated to Venezuela within ANCOM, such as synthetic rubbers and, eventually, styrene.

Longer-term plans may include the building of a new petrochemical complex in the Orient Region of the country where presently a huge availability of associated natural gas is being collected and which may allow the recovery of up to 1 million ton-per-year of ethane, suitable for ethylene production.

Two representative petrochemical joint-ventures were selected in Venezuela for a more detailed analysis:

- . Plásticos del Lago C.A., a joint-venture established in the petrochemical complex in El Tablazo, with PEQUIVEN participation, for the production of high-density polyethylene.

- . ETOXYL C.A., a joint-venture established by CORIMON, one of the biggest private chemical holdings in the country, in order to produce ethylene oxide and propylene oxide derivatives.

Company Profiles, Motivations and Objectives.

1.- Company: Petróleos de Venezuela S.A. (PDVSA)
 Apartado Postal 169
 Caracas 1010-A, Venezuela
 Tel: 708-1111
 TELEX: 21890 PDVSA VE

Contacts: Ing. Edmundo Cárdenas
 Coordinador de Petroquímica

 Ing. Nelson Reyes
 Gerente de Planificación Petroquímica

 Ing. Luis Umerez
 Gerente de Comercio Petroquímico

PDVSA was created by the Venezuelan State in 1976, in order to act as the State holding for all recently nationalized oil operation in the country. The previous operations which belonged to Exxon, Shell, Mobil, etc. continued to work as independently operated companies, under PDVSA ownership and control.

Most of the Venezuelan managers and technical personnel asked to be transferred to the new organization, bringing in all the accumulated technical knowledge and managerial expertise.

These capabilities were transferred to the petrochemical subsidiary company PEQUIVEN, when it was created in 1978 to carry-on with the state participation in the Venezuelan petrochemical industry initiated many years ago by IVP.

Another important change in the state participation in petrochemical development is given by the fact that PDVSA administers the annual investment and operating budgets available to all operating companies under the holding, therefore PEQUIVEN money requirements and its profitability has to be balanced against the money requirements and profitability as applied by the oil companies of the PDVSA holding. With this criterion, substantial unprofitable investments and costly operations have been since then, avoided.

PDVSA's Petrochemical Coordination Group is presently responsible to carry out the market and feasibility studies, which may result in new petrochemical investments with government participation. The development strategy is based on:

- . Better utilization of gas associated to oil deposits particularly in the Orient Region of the country, (Anzoategui State). All present petrochemical developments are either concentrated in the Central Region around Caracas and Valencia or close to Maracaibo in El Tablazo.
- . The creation of joint-venture operating companies, with PEQUIVEN participation to carry out new projects in the sector.

- . The use of the domestic market as the main fundamentation of future petrochemical project. The ANCOM market is considered as a temporal support, which may be lost in the future.

2.- Company: PEQUIVEN -Petroquímica de Venezuela S.A.
Apartado 2066, Caracas 1010, Venezuela
Tel: 208-3111
TELEX: 23206 PQCCS

Contacts: Dr. Manuel Ramos
President

Dr. Luis Marín M.
Director, Joint-ventures Division

Ing. José Ortiz
Sales Manager

Since the establishment of PEQUIVEN in 1968 its main objective has been the reorganization and revamping of all petrochemical operations inherited from IVP. The only new project has been a recently commissioned 60,000 MT/year high-density polyethylene plant, built and operated by an affiliated joint-venture PLASTILAGO.

So presently the following petrochemical joint-ventures integrate the PEQUIVEN family:

<u>Joint-venture</u>	<u>Plant</u>	<u>Capacity</u>	<u>Location</u>	<u>Start-up year</u>
ESTIZULIA	Polystyrenes	40,000 MY/Y	El Tablazo	1973
POLILAGO	LDPE	59,000 MT/Y	El Tablazo	1976
VENOCO	Propylene tetramer	30,000 MT/Y	El Tablazo	1976
PLASTILAGO	HDPE	60,000 MT/Y	El Tablazo	1983
VENOCO	Dodecylbenzene	43,000 MT/Y	Guacara	1969
PRODUVEN	Fluorochloromethanes	9,000 MT/Y	Moron	1976
OXIDOR	Phthalic anhydride	20,000 MT/Y	Valencia	1969
MONOMEROS	Caprolactam	21,000 MT/Y	Barranquilla	1973

PEQUIVEN took the shareholding participation of IVP in these companies, besides a similar participation in a few non-petrochemical joint-ventures and, finally PEQUIVEN also inherited the IVP direct operations in both complexes: Moron and El Tablazo. In Moron PEQUIVEN operates a fertilizers complex, for the production of nitrogen fertilizers, phosphate fertilizers and mixed fertilizers, all of them oriented to the internal markets.

In El Tablazo PEQUIVEN operates an ethylene-propylene plant as the core unit for the complex, capable to produce 150,000 MT/year of ethylene and up to 94,000 MT/year of propylene, if pure propane is utilized as raw material instead of a mixture of ethane and propane, supplied by the sister company CORPOVEN at the plant-site.

Besides, PEQUIVEN operates in El Tablazo, two big ammonia-urea trains, which production is geared almost totally for the export markets. This operation started as a joint-venture by IVP, but presently PEQUIVEN is the sole owner of the operating company NITROVEN.

A similar situation occurred with a sub-complex in El Tablazo, for the production of 40,000 MT/year of PVC resins for the internal

market. Outside of a caustic chlorine plant, the mini-complex is integrated by a ethylene dichloride (EDC) plant (using ethylene and chloride as raw materials), a vinyl chloride (VCM) plant obtained from the pyrolysis of EDC and a polymerization plant to manufacture different grades of polyvinyl chloride (PVC resins).

This mini-complex was originally built by a joint-venture formed by IVP and BF Goodrich as technology partner. Since 1980 PEQUIVEN controls all the shares of Plásticos Petroquímica C.A. (PETROPLAS) and is presently the sole owner of this petrochemical company.

This summarized list of PEQUIVEN operations in the petrochemical industry in Venezuela provides a good sample of the importance of the state-controlled company in the development of this industry. Unfortunately no figures were available to quantify the size of PEQUIVEN operations in comparison with, let say PETROQUISA of Brazil, but a superficial analysis demonstrates that PEQUIVEN still has quite a room to grow, supported by an abundance of hydrocarbon raw materials and a more active role in the export marketing within ANCOM in the first stage, and within Latin America with specific products, as a later stage. Some Venezuelan private petrochemical producers are already doing that with their production, so the potential for growth is there.

3.- Company: Plásticos del Lago, C.a. (PLASTILAGO)
Apartado 51874
Caracas, Venezuela
Tels: 2398653/2391164/2397364
TELEX: 23224 ESTIC VC

Contact: Dr. Luis Marín M.
Director

Plastilagos was formed in 1973 as a development company with the following partnership:

IVP	70%
Grupo Zuliano	30%

Grupo Zuliano is a Venezuelan private petrochemical holding created in the late Sixties in order to participate in joint-venture petrochemical companies in El Tablazo. The purpose of this new joint-venture was to develop a high-density polyethylen (HDPE) project in the country, based on the support given by the domestic market plus that recently obtained through Venezuela's participation in ANCOM.

The first task of the company was to find a suitable technology and technical assistance through the adequate selection of a foreign partner. This was found through the joint participation of CdF Chimie of France (which is already the technological partner in the low-density polyethylene plant) and Mitsui Petrochemical Industries Ltd. of Japan (which are the owners of the HDPE manufacturing process).

In 1979 the investment agreement was signed, in order to build a 60,000 MT/year high density polyethylene plant in El Tablazo, using Mitsui technology. Plastilago was then reorganized with the following shareholdings:

PEQUIVEN	45%
Grupo Zuliano	30%
CdF Chimie	15%
Mitsui	10%

As Mitsui capitalized its technology in the joint-venture, future capital increases were not accompanied by this partner so present shareholding is the following:

PEQUIVEN	49.00%
Grupo Zuliano	31.45%
CdF Chimie	15.00%
Mitsui	4.55%

The HDPE plant was commissioned by end 1983 and started normal operation early in 1984. Total investment required was in the order of US\$ 100 million, of which 40% was contributed through the joint-venture equity and 60% was financed by long-term loans.

The main raw material ethylene, is supplied by PEQUIVEN from its olefin core unit in El Tablazo.

4.- Company: Corimon C.A.
Apartado 3654
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Tel: 239-9133
TELEX: 25218 CORMO VE

Contact: Dr. Hans Neumann
Executive President

CORIMON is the holding of a Venezuelan industrial conglomerate, with interests in paints, graphics, chemicals and petrochemicals and more recently, in the food industries. It was founded in 1950 as a modest paint factory by its present owners, the Neumann family.

In 1962 the different industrial operations were reorganized in the present holding structure and in 1967, decision was taken to enter the petrochemical business, first with the installation of a phtalic anhydride plant in Valencia, with an initial installed capacity of 7,000 MT/year. A joint-venture was formed: Oxidación Orgánicas C.A. (OXIDOR) to carry out the project. Initial shareholders were:

CORIMON	59.44%
INVEQUIMICA	29.13%
IVP (now PEQUIVEN)	11.43%

Phthalic anhydride is a petrochemical intermediate utilized by the Venezuelan synthetic resins and plasticizers manufacturers, including companies in the CORIMON and INVEQUIMICA groups.

Raw material o-xylene is still imported.

Plant capacity was expanded in successive stages until reaching in 1982 the present 20,000 MT/year productive level.

At the same time some adjustments were made to OXIDOR ownership until reaching today's structure:

CORIMON	63%
INVEQUIMICA	27%
PEQUIVEN	10%

Phthalic anhydride has been exported over the years, mainly to other ANCOM member countries under the trade mechanism established within the Group (no import duties among the member countries and a common 30% tariff barrier against imports from third countries).

More significant is another joint-venture established by CORIMON together with OLIN Corp. of the U.S.A., in order to manufacture ethylene oxide and propylene oxide derivatives in the country, based on imported raw materials.

This new joint-venture, ETOXYL C.A., is analyzed later, but to round-up CORIMON group information is important to mention that the

Group sold about US\$ 250 millions during the last fiscal year ending May 1983, of which exports were not significative until later in the year, thanks to the substantial devaluation of the bolivar vis-a-vis the dollar, early in 1983.

5.- Company: ETOXYL C.A.
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Contact: Ing. Andrés Puky
General Manager

ETOXYL was created in the mid-Seventies as a joint-venture of 51% CORIMON and 49% OLIN Corp. of the U.S.A., with the purpose of establishing in Punta Camacho, State of Zulia, a petrochemical plant to produce ethylene oxide and propylene oxide derivatives, mostly poly-ether polyols utilized in the manufacture of polyurethane foams by other Venezuelan producers.

The 14,300 MT/year plant, which includes a nominal production capacity to up to 12,000 MT/year of different types of polyols, utilized technology developed by OLIN and this is the main reason of OLIN presence in the joint-venture. The plant was commissioned in 1979 after a capital investment of the equivalent of about US\$ 30 million.

During 1983 ETOXYL sold a US\$ 13 million value in different products of which about 10% were exported to other ANCOM countries.

OLIN's continuous technical assistance is assured through 15 years technology contract, revised every 5 years, according to Venezuelan regulations

Critical Comparative Analysis of the Joint-Venture Elements.

Venezuela's petrochemical industry is a good example of the application of the joint-venture concept in a mid-sized developing country.

Initial efforts in petrochemical development by 100% controlled governmental initiative were not successful due to the almost complete absence of experience in project management, control in investment allocations and efficiency in plant operations.

This was reflected in overruns in time and money allocated to the initial projects managed by IVP, the inadequate selections of technologies and plant designs, and difficulties to operate the plants at designed capacities, which reflected in increasing losses. These problems were largely overcome by the plants run under the joint-venture concept and later by the incorporation of the IVP operations under the Petr6leos de Venezuela holding as PEQUIVEN.

Under this new structure, PEQUIVEN-controlled operations, as well as the joint-ventures with PEQUIVEN participation, have to demonstrate the application of a criterion of efficiency, which is also thought after by the private investors both Venezuelan and foreign.

These efficiency criteria applied to every stage of a new petrochemical project, allowed the completion of US\$ 100 million investment in the high-density polyethylene plant, during a period of five years, instead of the ten or more years which took the completion of the petrochemical core unit at El Tablazo by the now defunct IVP.

Continuing with the example of the high-density polyethylene project, the joint-venture formed under the name of PLATILAGO, have a majority of Venezuelan capital provided by PEQUIVEN and by Grupo Zuliano, which is a Venezuelan holding organized just with the purpose

of investing in petrochemical joint-ventures with PEQUIVEN in the State of Zulia, where El Tablazo petrochemical complex is located.

The participation of PEQUIVEN in the joint-venture and the majority of national capital investment, granted the new company, among others, the following incentives:

- . A 5-year income tax holiday (because of PEQUIVEN's presence)
- . Access to ANCOM markets (because of majority of Venezuelan capital)
- . Exoneration of import duty payment on imported equipment.

If raw materials were to be imported (which is not the case because ethylene is provided by PEQUIVEN) the company, according with the general incentives for industry, could apply for an exoneration of the import duties on them as well.

Besides the domestic market for the joint-venture products is protected by a 60% tariff on similar imported products.

On the other hand, ANCOM common treatment of foreign investment limits the annual profit remittance abroad to up to 20% of the foreign capital invested. This limitation is not applicable to running royalty payments under the concepts of production technology transfer, or technical assistance contracts. In these cases, the technology transfer contracts and/or technical assistance contracts, have to be previously approved by the Venezuelan regulatory authority on foreign investments, industrial properties and technology transfers (CIEX).

Being ANCOM countries the first ones in Latin America to develop a joint criterium and common regulations on the handling of technology transfer for the industrial development of the Sub-Region, some of the

concepts and transfer mechanisms developed, were assimilated in variable degrees by other Latin American countries, particularly Brazil and Mexico.

Petrochemical joint-ventures organized without PEQUIVEN participation as it is the case of ETOXYL, have similar privileges and obligations, as described above, with the sole exemption of the income tax holiday.

According to Venezuelan commercial legislation regulating the corporations, they can be incorporated either for 50 years or for 99 years, being the same the duration of the joint-venture contracts.

Technical assistance contracts can be signed for a period of up to 15 years with revisions every 5 years, according to CIEX regulations.

In managing the projects during the construction period, the local partners took overall responsibility: CORIMON managed the ETOXYL project and a technical committee formed between PEQUIVEN and Grupo Zuliano supervised the project management team assigned by the two majority partners to the PLASTILAGO project.

The basic engineering was supplied in each case by the corresponding technology supplier (OLIN for ETOXYL, Mitsui for PLASTILAGO) and detailed engineering and construction was contracted with international engineering firms.

In view of relatively small local component in total investment (in case of PLASTILAGO was only 30%), financing was arranged mostly outside of Venezuela.

In the case of ETOXYL project, the most substantial part of the debt financing was arranged with the Andean Development Corporation

(CAF), the ANCOM project financing intergovernment agency, at 9 years with 9% interest. The US\$ million credit was supplemented with private banking loans and supplier's credit.

In the case of PLASTILAGO, three sources of external financing were arranged in order to finance about 60% of the US\$ 100 million capital investment.

- . A line of credit of up to US\$ 70 million in eurodollars provided by a syndicate of European banks, with ten and a half years repayment period, including 4 years of grace period at an annual interest rate of LIBOR plus a fixed interest rate over LIBOR.
- . French supplier's credit to finance up to 85% of purchases placed with French capital good suppliers. This credit was guaranteed by the specialized French government agency which provides insurance to French foreign credits used to purchase French equipment. Interest was 8.60% and was extended for 8 years.
- . A similar supplier's credit was arranged in order to purchase goods and services in Belgium.

The international engineering and construction firm which arranged a general contractor turn-key deal with PLASTILAGO was a Belgium concern: Coppee-Rust, which worked very closely with PLASTILAGO to organize the financial package.

The turn-key contract, which was signed in a figure below PLASTILAGO first estimates, outside the normal clauses contained some penalty clauses if delays in the prearranged schedule should occur. This was not the case.

Mitsui Petrochemical Industries, Ltd. capitalized its high density polyethylene production technology at a 10% participation of the original equity of the joint-venture. When the equity was increased recently, Mitsui didn't accompany the increase with fresh capital, so its share was reduced to the present 4.55%.

CdF Chimie, which was already involved in another, quite successful joint-venture with PEQUIVEN and Grupo Zuliano, producing low-density polyethylene with CdF technology, signed a technical assistance contract with PLASTILAGO, in order to help during the planning, project development and start-up of the high-density polyethylene plant. Besides, CdF placed fresh capital to integrate its 15% share in PLASTILAGO.

Training of PLASTILAGO operating personnel was provided in Venezuela, Japan and Portugal, under Mitsui's supervision. Portugal was included because there CdF together with Mitsui had formed a joint-venture with local capital there, to produce high-density polyethylene using the same Mitsui technology.

PLASTILAGO Board of Directors reflects the shareholding distribution: of the seven Board members, three are appointed by PEQUIVEN, one of them being the Chairman, two are Grupo Zuliano appointees and the remaining two chairs are occupied by one representative each of CdF and Mitsui.

Even if there is an unwritten gentlemen's agreement among PEQUIVEN and Grupo Zuliano given the latter the right to appoint the CEO in the joint-ventures where both participate, in the specific case of PLASTILAGO, the general manager and CEO was a PEQUIVEN nominee, with Grupo Zuliano approval.

The case of ETOXYL is simpler in the sense that being only two

partners and the local partner having a majority share of the joint-venture, he has a majority also in the Board and appoints the CEO, albeit key decisions such as an annual budget, new investments, and other aspects influencing the long-range performance of the joint-venture, have to be taken by the unanimous vote of ETOXYL Board.

All the other policies, norms and procedures in both joint-ventures, are taken in accordance with the rulings of the majority partner: PEQUIVEN (Petróleos de Venezuela) in the case of PLASTILAGO, CORIMON in the case of ETOXYL.

Raw material supply is quite different in both joint-ventures analyzed:

PLASTILAGO purchases the key raw material ethylene from PEQUIVEN at El Tablazo, under an annual contract based in bolivars. The price, compared with the present dollar equivalent, results more attractive than the international ethylene prices, but some clauses in the contract allows for price adjustments according to the variation of some Venezuelan macroeconomics indicators. Other services such as electricity, water fuel gases, etc. are also supplied by PEQUIVEN to the down-stream industries located at El Tablazo petrochemical complex.

Even if the ETOXYL plants are located in El Tablazo's proximity, they constitute a completely separated operation and, more important, the key raw materials ethylene oxide and propylene oxide, are imported in bulk by using specially built sea-going ships. Due to this difficulty in raw material transportation, ETOXYL has signed an agreement with OLIN, for the later to act as raw material procurer and shipper from the U.S.A. This is not exclusive arrangement and, at least once, ETOXYL imported some raw materials from other supplier, in Brazil.

All raw materials imported by ETOXYL are exonerated of import duty payments, in accordance to the general industrialization incentives established by the Venezuelan government.

On the other hand, those petrochemical products manufactured in the country receive a tariff protection in the range of 60% if they are sold within the country, and in the range of 30% if they are sold within ANCOM market.

This has been the key incentive for the Venezuelan entrepreneurs to establish down-stream petrochemical industries in the country even taking into account that presently PEQUIVEN only produces ethylene and propylene as basic petrochemical raw materials. Witness the cases of OXIDOR and ETOXYL among other.

Domestic markets are attended directly by the joint-venture organizations in all the cases analyzed. For export to ANCOM and other Latin American markets, Venezuelan petrochemical producers utilize local representatives.

With the present degree of tariff protection and the relative small size of the Venezuela petrochemical market, which justifies one producer per product, if any, in general the producers have access to 100% of domestic market.

In the case of ANCOM, the situation varies due to a lower tariff barrier against third countries production, but more often because there is also some competitive production in other ANCOM countries, mainly in neighbor Colombia. This is not the case with the products of the two joint-venture analyzed, but they are very recently in a competitive position due to the overvaluation of the bolivar vis-a-vis the dollar until early 1983.

There is no doubt on the benefits in establishing petrochemical joint-ventures in Venezuela.

From the viewpoint of the government (in this case represented by the holding Petróleos de Venezuela) the formation of joint-ventures to handle the petrochemical development of the country, liberates the corresponding amount of scarce financial and human resources to be applied in the oil development of the country.

From the viewpoint of PEQUIVEN, the down-stream petrochemical joint-ventures formed by PEQUIVEN initiative and with PEQUIVEN participation, allow a rational usage of the basic petrochemicals produced by PEQUIVEN, which are based in the use of associated natural gas, of which the country is amply endowed.

From the viewpoint of the private investor, PEQUIVEN's presence in petrochemical joint-ventures, gives a more direct access to government incentives and guarantees a permanence in the long-term development policies for the petrochemical industry.

Also the presence of a foreign technological partner, tied up to the joint-venture not only through a minority equity participation but more important, by a long-term technical assistance contract, provides the joint-venture with access to technological improvements as well as rapid-reaction trouble-shooting services.

Generally speaking, the joint-ventures analyzed in Venezuela don't have enough history on operations as to derive valid recommendations on how to strengthen or improve its operating efficiency from the viewpoint of the joint-venture arrangements, but through the analysis of joint-venture formulation stage and project development stage it seems they have both performed satisfactorily to all parties concerned.

What is very clear a point in favor of the joint-venture concept was the very bad initial experience of the Venezuelan government, when they wanted to develop the petrochemical industry of the country by themselves. The time, money and effort lost in the experience are only very recently being recouped. through the drastic changes already analyzed.

This could be perhaps the best lesson derived from the Venezuelan petrochemical experience.

Another important and positive lesson, is the way by which the Venezuela petrochemical industry is making good use of the expanding markets obtained through the ANCOM negotiations, albeit the private sector has been up to now more agile in making good use of it.

ANNEX A

PETROCHEMICAL JOINT-VENTURES SURVEYED IN DETAIL

ARGENTINA

Atanor SAM
Petroquimica Rio Tercero S.A.
PASA - Petroquimica Argentina S.A.
Petroquimica General Mosconi S.A.I.C.
Petroquimica Bahia Blanca S.A.

BRAZIL

Petroquimica Uniao S/A.
Oxiteno S/A (Ultra Group)
Atlas Industrias Quimicas S/A (Ultra Group)
Etoxilados do Nordeste S/A (Ultra Group)
Rhodia S/A.
Cia. Brasileira de Estireno
PETROQUISA - Petrobras Quimica S/A.
NORQUISA - Nordeste Quimica S/A.
COPENE - Petroquimica do Nordeste S/A
SALGEMA - Industrias Quimicas S/A
Petroquimica da Bahia S/A
PRONOR - Productos Organicos S/A
Isocianatos do Brasil S/A.
Nitrocarbono S/A

CHILE

Petroquimica Dow S.A.

ANNEX A

MEXICO

Poliolos S.A. (Alfa Group)
Nylon de México S.A. (Alfa Group)
Fibras Químicas S.A. (Alfa Group)
Celanese Mexicana S.A.
Industrias Resistol S.A.
Fenoquímica S.A.
Polycyd S.A. (CYDSA group)
Instituto Mexicano del Petróleo (IMP)

VENEZUELA

Petróleos de Venezuela S.A.
PEQUIVEN, Petroquímica de Venezuela S.A.
Plásticos del Lago C.A. (Zuliano Group)
CORIMON C.A.
ETOXYL C.A. (Corimon Group)

ANNEX B

TYPICAL JOINT-VENTURE CONTRACT CHAPTER HEADINGS

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Ch. IX	Financing
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Ch. XIII	Plant Site and Housing
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Ch. XV	Design and Construction
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