OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

United Nations Industrial Development Organization

Distribution
LIMITED

ID/WG.34/12
23 July 1969

ORIGINAL: ENGLISH

Interregional Petrochemical Symposium on the Development of the Petrochemical Industries in Developing Countries

Baku, USSR, 20 - 31 October 1969

PET.SYMP. A/10

D00341

FINANCING PETROCHEMICAL VENTURES IN LATIN AMERICA 1/

by

A.E.Abrahams
D. Gamarsky

Interamer Research Corporation
Stamford
United States of America

1/ The views and opinions expressed in this paper are those of the authors and do not necessarily reflect the views of the secretariat of UNIDO. This document has been reproduced without formal editing.

id.69-4188

D00341

United Nations Industrial Development Organization

Distribution
LIMITED

ID/WG.34/12/Corr.1
5 May 1970

ORIGINAL: ENGLISH

Interregional Petrochemical Symposium on the Development of the Petrochemical Industries in Developing Countries

Baku, USSR, 20 - 31 October 1969

PET.SYMP. A/10

FINANCING PETROCHEMICAL VENTURES IN LATIN AMERICA

Corrigendum

Cover Page: Change name of second author to read as follows:

W.D. Gerensky

Distribution
LIMITED

ID/WG.34/12 SUMMARY
23 July 1969

ORIGINAL: ENGLISH

United Nations Industrial Development Organization

Interregional Petrochemical Symposium on the Development of the Petrochemical Industries in Developing Countries

Baku, USSR, 20 - 31 October 1969

PET.SYMP. A/10

SUMMARY

D00341

FINANCING PETROCHEMICAL VENTURES IN LATIN AMERICA 1/

by

A.E. Abrahams
W.D. Goresumky

Stamford
United States of America

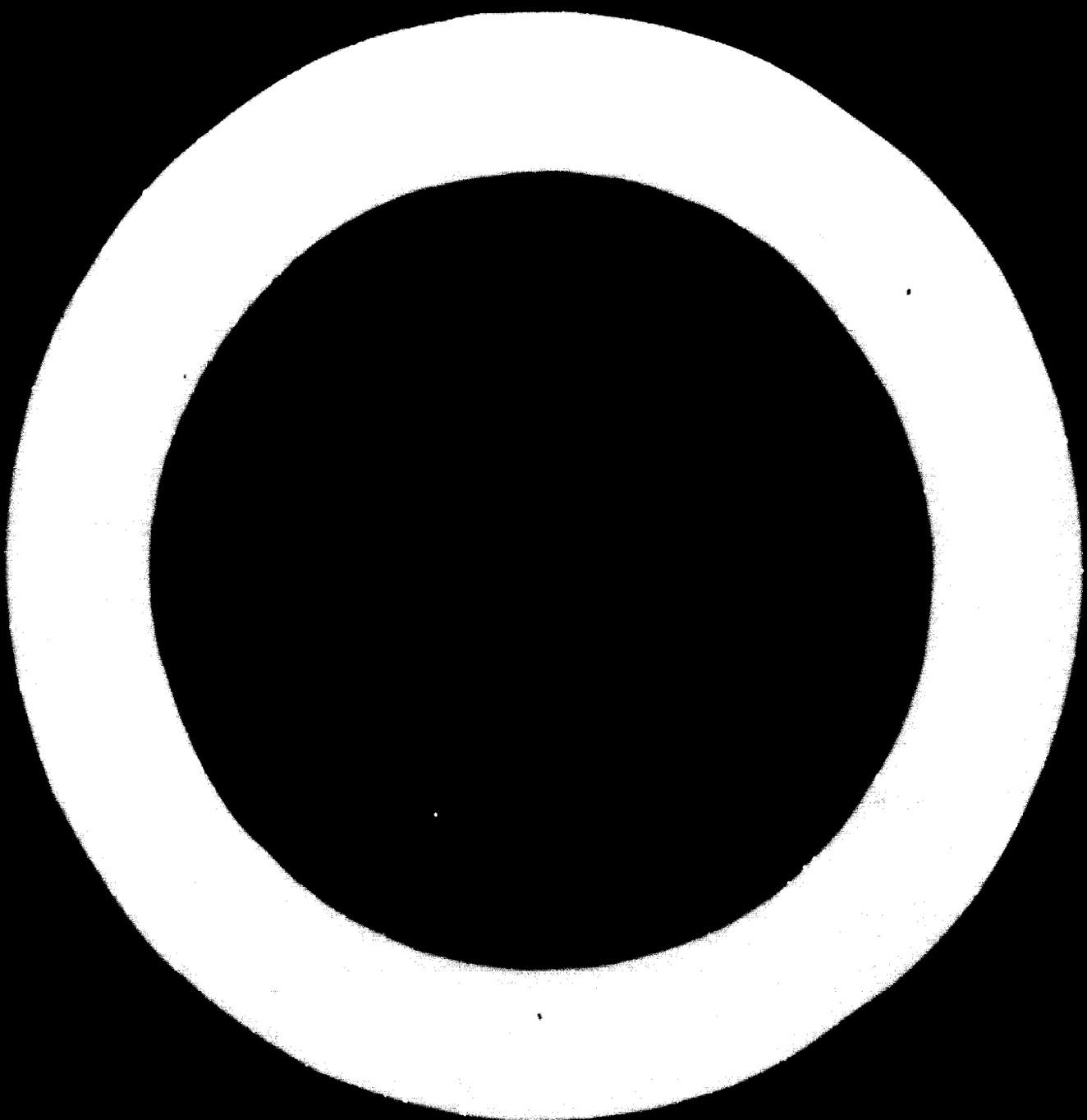
The Latin American nations, taken together, have a population exceeding 240 million, which may likely top 600 million by the end of the century. The Latin American economies, while growing and diversifying in an overall sense, find progress and improvement too slow in respect to their growing population. On balance the area has been largely dependent upon agricultural production to earn foreign exchange and to support the local economies. This has proven increasingly unsatisfactory, and it has been recognised that the area must diversify into industrial production to progress.

1/ The views and opinions expressed in this paper are those of the authors and do not necessarily reflect the views of the secretariat of UNIDO. This document has been reproduced without formal editing.

Top priorities have been in import substitution and in the so-called building block industries, of which petrochemicals is one. Latin America has substantial petroleum and natural gas wealth, although it is not now widely distributed. Factors which make widespread petrochemical development difficult in Latin America are the size and location of markets, the location and cost of petrochemical feedstocks, a shortage of local investment capital, and difficulty in attracting overseas investment capital in sufficient amounts.

There are many means and sources by which petrochemical ventures have and will be financed, including local and overseas equity capital, local private and public debt capital, overseas private borrowing, and overseas national and multinational lending organisations. In many cases a combination of financing sources has proven to be the most workable and most satisfactory means of structuring projects. An example given below is the Petroquimica Uniao project, which is drawing on local investment and financing, on overseas multinational investment capital, and on overseas private and multinational borrowing.

In considering the capital structures of Latin American petrochemical ventures, it is vital to consider the effect of such financing on national accounts and availability of investment capital as well as the effect of the method on the project alone. The paper analyses sources and problems in this light.



Introduction

Consideration of the need for large-scale petrochemical investments in Latin America, the role such investments play and will play in the economic development of the Latin American Complex, and the means by which such necessary petrochemical projects can be implemented, especially how they can best be financed, is an important and especially-timely subject in 1969.

As noted by Dr. Josef Peron[1] earlier this year, "There is a widespread belief that chemicals, a traditional product of highly industrialised countries, can only be manufactured there, whilst developing countries will produce, in the main, farming produce and raw materials for export, buying their requirements of chemicals from the proceeds in foreign currencies from the industrialised countries.... But.... this policy has been proved unrealistic: commodity prices have shown a long-term declining trend, natural raw materials are being progressively replaced by synthetics, and more economics uses of natural raw materials by the industrial nations all tended to prevent a satisfactory expansion of export income for the developing or mainly agricultural countries."

Dr. Peron goes on to observe that raw-materials producing countries must use a large proportion of scarce foreign currency reserves in interest and capital repayment obligations incurred through acceptance of development aid.

Basically the same problem was stated from a different standpoint by Dr. Carlos Lleras, President of the Republic of Colombia, during his conference with President Nixon in Washington on June 11, 1969,[2] when he complained that private capital investment in new industry in Latin America by United States and European firms has become a hinderance rather than a help to the economic health and development of the area: it was claimed that repatriation of profits by overseas firms in 1968 was at the rate of five times that of new overseas capital influx, thus creating a substantial drain on the net capital available for new investment in the region. While the U.S. Department

1) Dr. Josef Peron, Recklinghausen, "The Role of Chemicals in the Third World", INTERECONOMICS, April 1969, Verlag Weltarchiv GmbH, Hamburg.

2) The New York Times, June 12, 1969, Page 1.

of State contested the magnitude of the disparity, it was admitted that net capital withdrawals had indeed exceeded new inputs, and that this situation in fact had occurred to a greater or lesser extent for the past five years.

What has now been recognized by both Latin Americans and by their friends is that while hard-currency inputs to Latin America, in the form of development loans, private capital investments, and various credits have stimulated more rapid development of industry, including petrochemicals, than would have been possible if these projects had been entirely financed internally, that this more-rapid rate of industrial development has been achieved at considerable cost to the economic integrity of those countries which have received, in one form or another, large quantities of foreign capital.

If the unfortuante financing aftereffects mentioned are true for industry in general, then they must be especially true of petrochemical investments: petrochemicals are a highly capital-intensive industry, that is, the ratio of dollar capital investment to output or sales dollar potential is very high.

There are additional factors which must be weighed in any consideration of the best means to finance petrochemical ventures in Latin America, and, for that matter in many other developing economies. The most important of these concern the profitability of proposed petrochemical ventures. For most petrochemical schemes considered for most Latin American countries, one of the most difficult points to be overcome is the inability to take advantage of the economies of scale possible in petrochemical complexes:

- In most countries local markets cannot support a plant of optimum economic size;
- Exports to large consuming markets, the United States and Western Europe are in most cases out of the question because of unfavorable economics in the light of low world prices for petrochemical commodities;
- The cost of feedstocks in some countries is very high.

Brasil, while it enjoys the largest internal market for petrochemical products of all Latin American nations, has nonetheless some of the most difficult problems of implementing viable petrochemical projects, including the fact that she must import essentially all of her basic petroleum

requirements at a considerable cost to her hard-currency foreign reserves. The fact that Brazil's petrochemical industry has and is expanding in dynamic fashion on a sound economic basis is a credit to bold and imaginative planning on the part of the government which has earned the support of the major international lending organizations and the confidence of private overseas capital.

Clearly, the rate of development of the petrochemical industries of Latin America is destined to increase at greater rates than in the past:

- known reserves of petroleum and natural gas in Latin America are already significant;
- vast new reserves remain to be discovered;
- the demand for petrochemical derivatives - plastics, paints, synthetic rubber, nitrogen fertilizers, and synthetic fibers - to name only a few, is increasing rapidly in every Latin American country;
- there is a compelling and natural desire on the part of all Latin American countries to utilize natural resources and to become independent of imports of industrial goods.

It is vital to the economic health and development of Latin America that new industrial projects, including petrochemicals, be conceived, financed, and executed in the most efficient manner, and that all new capital inputs; government, private, and foreign; be utilized in the most economical fashion possible. Among other things, means must be found to increase the magnitude of local capital investment as compared with overseas investment, at the same time providing an economic atmosphere to encourage the continued influx of necessary overseas capital and technology.

The present paper reviews the economic climate in which current and future petrochemical projects are and will be immersed, describes and analyzes the means by which existing petrochemical projects were financed, and proposes guidelines for the rational analysis of financing methods for future projects.

The Why of Latin America

Taken as a whole, Latin America represents at the same time a growing and future important market for petrochemical products and their derivatives, and a challenge to the more developed and more wealthy nations. The 48 nations of Latin America identified in Table I have an aggregate 1968 population of 240 million. If Latin America maintains its present overall rate of population increase of 3 percent per year, it may look forward with undoubted dismay to a total population of 340 million in 1980, 460 million in 1990, and to 610 million souls by the end of the present century.

To feed, clothe, and house this rapidly increasing population will require enormous new investment in fertilizers and other farming materials and equipment, building products and other industrial products, many of them based or dependent upon petrochemicals. The authors have not read of any recent estimates of the total of invested capital which will be required in this century, either in new industry in general or in chemicals and petrochemicals, but doubtless the total must run into the many tens of billions for chemicals alone.

The Latin American Complex is not rich in terms of per capita income or per capita GNP. Quite to the contrary: average per capita income for all Latin American countries in 1967 was only $ 394 (see Table I) per capita income and GNP are increasing, the latter quite rapidly for most countries, but the former little or not at all in many countries because of the effect of population increases. At the same time every Latin American country is giving top priority to industrialisation on the broadest scale possible. Not only are petrochemicals included, where they are possible at all, but petrochemicals themselves feast upon the development of other modern industries: Automotive (paints and lacquers, plastics, cushioning and padding, synthetic fiber upholstery); Building Products (paints, plastic pipe, decorative panels, and a host of other petrochemical-based products); Textiles (synthetic fibers, processing aids, finishing agents); Soaps and Detergents; and many others. As observed in a previous paper,[3] petrochemicals represent one of the basic "building block" industries, which utilise local mineral wealth and which

3/ "Chemical Opportunities in the Emerging Nations", M.D. Cornusky and A.E. Abrahams, Proceeding of the American Chemical Society, Atlantic City, New Jersey, September 1965.

TABLE I

DEMOGRAPHIC PROFILE OF LATIN AMERICA - 1967

Country	Population (millions)	Population Growth (percent per year)	Per Capita Income (US dollars)
Argentina	22.7	1.6	700
Bolivia	4.4	2.4	149
Brasil	84.7	3.0	271
Chile	9.0	2.4	501
Colombia	18.5	3.0	292
Costa Rica	1.6	3.8	406
Dominican Rep.	3.8	3.6	264
Ecuador	5.3	3.4	224
El Salvador	3.0	3.2	279
Guatemala	4.8	3.3	314
Honduras	2.3	3.1	289
Mexico	44.8	3.5	470
Nicaragua	1.7	3.5	365
Panama	1.3	3.2	513
Paraguay	2.1	2.6	224
Peru	12.0	3.1	378
Uruguay	2.8	1.4	569
Venezuela	9.0	3.4	895
	233.2 (total)	3.0 (avg.)	381 (avg.)

Source: United Nations; UN Economic Commission for Latin America (ECLA)

by their very existence spawn and feed numerous down-stream industries. Latin America, much of which is at the brink of the "dynamic break-out stage" of economic development, clearly needs a diversified petrochemicals base now.

Table II shows historical and projected values for industrial activity for selected Latin American countries. It will be noted that the industrial component of the gross domestic product of nearly all Latin American countries is growing, in many cases extremely rapidly. Such increasing importance of the industrial component represents sure proof of the progress made to date in diversifying these economies away from traditional dependence upon agricultural production, much of which (coffee, cocoa, bananas, manioc, etc.) is coming under increasing competition from the developing nations of Africa and Asia, with a resulting decline in world prices and thus national and regional hard currency earnings.

Studies conducted by ECLA[4] observe that in the period between 1964 and 1966 the contribution of industry to the overall GDP of Latin America reached 25 percent for the first time, inching ahead of agriculture. Progress has not been the same for all countries, however. At the present time manufacturing represents about 36 percent of GDP in Argentina, 27 percent of GDP in Brazil and Mexico, but 10 percent or less for countries such as Bolivia and Ecuador. On a broader comparison, however, it is interesting to note that in spite of intensive efforts to promote the industrialization of Latin America, that area enjoys barely more than 3 percent of total world industrial production. Clearly she has a long way to go.

The Inter-American Development Bank, in its published proceedings[5] of the IDB Round Table held in Bogota in 1968, takes note of the problems associated with stimulating a more rapid rate of investment in the manufacturing sectors of Latin American economies, and of the pressing need for such stimulation.

The recent history of capital inflow to Latin America is presented in Tables III to IV.

---

4) America Latina y el Simposio Internacional sobre Desarrollo Industrial, ECLA, 1967.

5) Multinational Investment in the Economic Development and Integration of Latin America, Inter-American Development Bank, Washington, D.C., October, 1968.

TABLE II

Latin American Industrial Activity

(Selected countries)

Year	Gross Domestic Product (at factor cost)	Percent Industrial
	Argentina (1000 Million Pesos)	
1950	62.5	31
1953	119.0	28
1958	367.7	34
1960	882.2	35
1963	1,597.2	35
1965	3,014.2	37
1966	3,718.0	37
	Brazil (1000 Million Cruzeiros)	
1950	214.7	24
1953	361.8	24
1958	1,062.1	25
1960	1,924.8	25
1963	7,796.7	25
1964	15,107.2	28
1965	24,261.9	27
	Colombia (Million Pesos)	
1950	7,400	19
1953	10,007	18
1958	19,311	21
1960	24,744	22
1963	40,476	22
1965	54,933	22
	Mexico (1000 Million Pesos)	
1950	41.1	27
1953	46.0	28
1958	66.9	28
1960	74.3	30
1963	85.9	31
1965	99.6	32
1966	107.1	32

TABLE II - Continued

Year	Gross Domestic Product (at factor cost)	Percent Industrial
	Venezuela (Million Bolivares)	
1960	23,603	39
1963	27,542	40
1966	36,710	n.a.

Source: United Nations Statistical Yearbook

It will be noted that in the period 1961 - 1965 the United States was the origin of 77.55 percent of total direct overseas investment in Latin America, having committed $ 2.89 billion of a total for the period of $ 3.63 billion. The nations of Western Europe invested most of the remainder, with Japan having originated $ 143 million, or 3.9 percent of the total.

Turning to sources of international economic assistance, it is clear from the tables that the Interamerican Development Bank and the World Bank, together with the International Finance Corporation, in the period 1962 - 1967, represented nearly 90 percent of total international economic assistance, for all purposes, to Latin America, excluding, of course, unilaterial assistance from the United States and others. During the quinquenium, the role of the World Bank declined in importance as that of the Inter-American Development became predominant. The activities of these two institutions in financing petrochemical ventures is discussed in a subsequent section.

With the role of the European Economic Community in providing economic assistance to Latin America has been small in the past, it has also been increasing, and at an accelerating rate. From a historical standpoint this is not only admirable, but indeed fitting. While it is clear why strong economic and other ties remain between many Western European countries and many of the developing nations of Africa and Asia, as a result of recent-past economic and political connections, it has largely been forgotten that Western European nations exerted very substantial economic and political influence in Latin America throughout the 19th century, and in some areas well into the 20th. While the economic dominance of the United States in the Western Hemisphere has dulled these memories, in fact strong social and economic ties still remain. In addition, the major manufacturing corporations of Western Europe, like those of the United States, and more recently Japan, are becoming increasingly active in capital investments in Latin America through acquisitions, joint ventures and solo ventures in various industries including chemicals.

Latin America taken as a whole has considerable and increasing petroleum and natural gas reserves upon which to mount petrochemical industry development. The distribution of these natural resources discovered to date is, however, not uniformly distributed, as will be seen from tables and it will be noted from

TABLE III

Latin American Capital Inflow

A. Direct Foreign Investments (Millions of Dollars)

Source/Year	1961	1962	1963	1964	1965	Total	Percent of Total
United States	653	357	479	683	719	2,891	79.55
Italy	26	84	76	18	4	208	5.72
W. Germany	54	52	16	16	21	159	4.38
Japan	32	36	20	11	44	143	3.94
Netherlands	35	-	65	27	-	127	3.49
Sweden	20	8	18	8	18	72	1.98
Canada	-	25	-	-	-	25	0.69
France	6	-	1	-	-	7	0.19
Norway	-	-	-	1	1	2	0.06
Total	826	562	675	764	807	3,634	100.00

Source: Inter-American Committee for the Alliance for Progress (CIAP)

B. External Financing Requirements and Availabilities (Millions of Dollars)

	1965	1966	1967 */
Requirements			
Deficit on current account	446	878	1,410
Amortization of public and monetary sectors	1,922	1,462	1,329
Increase in reserves	338	-51	141
Total	2,706	2,289	2,800
Availabilities			
Official non compensatory capital	1,185	1,329	1,480
Official compensatory capital	232	232	290
Private investments	-95	118	406
Non compensatory private loans	893	128	240
Various sources	551	486	464
Total	2,706	2,289	2,800

*/ Projections

Source: CIAP

TABLE IV

Sources of Economic Assistance

A. International sources (Millions of Dollars)

Source/Year	1962	1965	1966	1967 */
European Economic Community (EEC)	5	8	11	11
Inter-American Development Bank (IDB)	141	240	369	400
International Development Association (IDA)	31	18	8	-
International Finance Corporation (IFC)	3	10	24	20
International Bank for Reconstruction and Development	410	212	375	250
United Nations	39	54	65	59

*/ Estimates

Source: Alliance for Progress

B. U.S. sources (Millions of Dollars)

Source/Year	1962	1965	1966	1967 */
Agency for International Development (AID)	478	538	647	581
Export-Import Bank	109	166	285	400
Foods for Peace	130	118	202	87
Social Progress Trust Fund	286	101	86	-
Other sources	120	284	288	280

*/ Estimates

Source: Alliance for Progress

Table V that Venezuela has petroleum reserves of 15.5 billion barrels, or over 50 % of total Latin American established reserves. Brazil, on the other hand, while it has the most diversified petrochemicals industry in South America and also the largest internal market for petrochemical products, is oil-poor, and must import two-thirds of its total requirements.

Intensive exploration and development in many parts of Latin America promise, however, to provide substantial additions to the area's petroleum reserves.... Results of developmental drilling on the western rim of the Amazon Basin in Colombia and Ecuador have been highly encouraging, and suggest that substantial additional reserves may be developed in that general area in time.

Brazil, which needs oil and gas, has been encouraged by recent results obtained offshore Bahia by Petrobras. Very little has been done in the Amazon Basin itself, partly because of difficult logistics and of the incomplete inputs to rationalize the complex geological profile which exists. However many petroleum geologists are convinced that enormous quantities of oil and gas may one day be discovered there.

Table VI shows the breakdown of natural gas reserves in Latin America, and that as in the case of crude petroleum, Venezuela is by far the leading producer of natrual gas. Venezuela is striving, through the activities of the Instituto Venezolano Petroquimica (IVP) alone and in concert with overseas chemical and petroleum companies, to utilize this gas for petrochemicals production.

A most interesting situation exists in Bolivia which has today over 85,000 million cubic meters of proven natural gas reserves. Work is underway to utilize this gas nationally in greater amount for fuel and also to produce chemicals, although the local markets are small and the logistics of moving finished chemicals difficult. But the interesting aspect of the Bolivian gas situation is that plans are afoot to export up to 300 million cubic feet per day by pipeline to the industrial centers of Argentina and Southern Brazil. Such a project would not only benefit the economy of Bolivia, but would provide the basis for and expanded and, presumably, more economic petrochemicals industry in the consuming countries, since the cost of pipeline transportation and amortization would be supported importantly by industrial and fuel

TABLE V

Latin American petroleum reserves - 1968

Country	Oil (1,000 Barrels)
Argentina	3,100,000
Bolivia	585,000
Brasil	850,000
Chile	136,000
Colombia	1,700,000
Ecuador	325,000
Honduras	500
Mexico	5,500,000
Peru	475,000
Trinidad	610,000
Venezuela	15,500,000

Source: Oil & Gas Journal, 30 December 1968

TABLE VI

Latin America natural gas reserves - 1968

Country	Natural Gas (Billion Cubic Feet)
Argentina	8,500
Bolivia	5,000
Brasil	1,000
Chile	3,000
Colombia	3,500
Ecuador	150
Honduras	-0-
Mexico	11,500
Peru	1,750
Trinidad	1,000
Venezuela	27,500

Source: Oil & Gas Journal, 30 December 1968

customers.

As of June 1969, it was still too early to assess the possible impact of natural gas discoveries made offshore Trinidad, in the Gulf of Paria. There are some indications that the gas finds there may represent a very substantial field. If true, it is conceivable that they could have an important effect on the thinking regarding Venzuela's massive effort for industrialization of the Guayana.

Turning at last to petrochemicals themselves, it will be seen from table VII of the Appendix that petrochemical activity has been increasing in intensity in many parts of Latin America, especially in Mexico, Argentina, Brazil, and Colombia. In addition to increasing activity in those countries, there are plans for further petrochemical installations in Chile and Peru. Projects already in existence or in the late planning stage are identified in a later section of this presentation.

Financing Problem

A number of problems have been cited in the obtaining of capital for Latin America petrochemical ventures. These include:

1. The apparent scarcity of viable projects.
2. The high cost of identifying, studying and implementing suitable projects.
3. Lack of project analysis and management skills in Latin America in the petrochemical area, including skills in project implementation.
4. Lack of awareness on the part of investors in the industrialised countries of the potential opportunities in the Latin American petrochemical area.
5. Time lags in project evaluation and implementation.
6. Capital shortage in Latin America.

The first five points noted above are actually all interrelated. It is true that petrochemical ventures, being by nature highly capital intensive, and hence very dependent on economies of scale, require substantial markets. As Latin American markets are often still in their infancy, many potential projects have on further analysis failed to prove economically feasible. This condition even tends to intensify as, has been occurring, the most attractive

TABLE VII

Plant Capacities - Selected Brazilian Petrochemical Products

Product	Capacity 1966 (Metric Tons)	Possible Expansion Through 1976 (Metric Tons)
SBR	47,500	67,600
Polypropylene	10,950	26,900
Polyvinylchloride	34,000	123,300
Polystyrene	18,000	68,900
Polyethylene - high density	11,000	98,500
Polyethylene - low density	4,800	35,970
Ethylene oxide	-	39,200
Vinylchloride	34,000	123,700
Acrylonitrile	-	10,900
Acetone	7,200	23,900
Butadiene	63,000	118,300
Benzene and toluene	22,600	208,300
Styrene	16,000	83,580
Cyclohexane	-	62,050
Hexamethylene diamine	5,000	17,600
Phenol	5,500	25,800
Maleic anhydride	300	4,600
Phthalic anhydride	3,400	24,000
Methanol	9,000	68,600
Carbon black	36,000	89,000

Source: Banco Nacional do Desenvolvimento Econômico (BNDE)

petrochemical projects in each country are preempted.

Nevertheless, on our opinion, many excellent projects do exist and the number will most certainly grow as Latin American end - use markets expand and regional integration of markets becomes more a reality. In this respect, over the course of several years, we have been able to develop a very lengthly list of very promising petrochemical projects for the future.

Why then the apparent scarcity of good projects? The answer seems to lie partically in the high cost of reliable project analysis; the serious shortage of personnel in Latin America for project analysis, capable of identifying and determining the feasibility of good projects, and, perhaps most importantly, the ability to implement in those instances when a good project is demonstrated to exist. It should be added, that it would be a mistake to believe that good chemical engineers and industrial economists do not exist in Latin America. They most certainly do, but are small in number in relation to the total potential demand for their services.

The matter of implementation is particularly critical. Implementation, involving as it does the obtaining of technology and capital, requires effective approaches to the sources of these factors in the industrialised countries. In order to do this, however, it is necessary to identify these sources in a manner that will achieve tangible results.

Unfortunately, our experience has been that project implementation skills are often very weak or entirely lacking in Latin America, particularly when it comes to "selling" projects to foreign investment sources. Selling, in its most primitive sense, involves finding the customer and demonstrating why the customer should buy. Regarding the first point, we have noted that in most instances, individuals concerned with implementating potential petrochemical projects, in both the public and private sectors, lack current, complete and reliable information on the parties to approach regarding financing and technology. Following the establishment of actual contacts, all too often projects do not come to fruition due to the failure to actively follow-up. Latin American countries would be well-advised to improve systems and procedures in this respect.

It may be argued that international investors will actively and on their own initiative seek out good projects, considering the excellent potential

opportunities that do exist. It should be noted, however, that a general awareness of the petrochemical opportunities in the Latin American countries is not widespread. One limiting factor is the relatively high cost of identifying and analyzing opportunities. It is true that the sums involved are relatively trivial, as far as most large companies are concerned, particularly petroleum companies. Nevertheless, study funds for Latin America must compete against funds for more readily understandable domestic projects. The high cost of making studies will increasingly become a more important factor as the need arises for the manufacture of downstream derivatives, produced in the industrialised countries by more moderate-sized companies.

An additional problem in financing is the characteristic shortage of capital in Latin America. This is true; for most petrochemical projects foreign funds are required in quantity. Our experience has shown that there is considerably more capital in Latin America than is commonly believed, even in regions of very marginal income. Often this capital is invested in unproductive forms and the capital owners could be encouraged to consider petrochemical investment, provided the projects are perfectly planned.

A final problem in the financing of Latin American petrochemical projects is the characteristic time lag in project evaluation and implementation. These lags, of course, are not just characteristic of the petrochemical field alone. An excellent analysis of the time lag problem is given in a recent article by R. Mountain.[6] This article very ably illustrates the typical problems, particularly problems associated with foreign assistance projects, which result in greatly increased overall project costs due to inflation, devaluation and other factors. Overruns at the construction stage, a problem very characteristic of the petrochemical industry, are more often associated with such delays rather than mistakes in engineering estimates.

6) Robert Mountain, "How to Underfinance an Overseas Project" Worldwide P and I Planning, November/December 1968, pp 26-34.

Financing Sources

A rather wide variety of potential sources of capital have been utilised or exist for the financing of petrochemical projects in Latin America. From the standpoint of equity capital, basic sources include local public entities; local private companies or investment groups; foreign private manufacturing or investment groups; and foreign organizations and international agencies. With respect to borrowed funds, available sources include local public entities; local banks or private financing institutions; foreign private lending agencies and international public lending agencies.

In exhibit I, a summary is given of the principal means of financing petrochemical projects in developing countries along with an itemization of the advantages and disadvantages of each method. The table includes all of the common methods and serves to offer a very useful overall view of the prevailing possibilities.

In the past, foreign private investment in the Latin American chemical industry has been of considerable importance. This situation is reflective of the historical shortage of alternative capital, and perhaps equally important, the lack of availability of petrochemical technology and appropriate managerial and technical personnel. Foreign private investment has offered the foreign corporate investor a maximum degree of control over this overseas operations and the ability to integrate the overseas operation closely with home country operations. Under direct foreign investment, the foreign investor has been able to maximise return on investment, although instances may be cited where foreign investors may have done better in concert with local nationals. Nevertheless, it must be recognised that a strong prejudice exists in favor of direct ownership on the part of the typical foreign manufacturing company.

Although direct private foreign investment has been an extremely important factor in Latin American (as witness the major petrochemical commitments in Brasil of Union Carbide, in particular) very little is generally known on the details of most private projects. The obvious reason for this lack of information is the extreme reluctance of most operating companies to reveal detailed information due to taxation and other considerations. Conversations with New York banking sources reveal the following pattern with respect to

Exhibit I

Advantages and Disadvantages of Various Financial Sources for Developing Country Petrochemical Projects

Equity Financing

By Local Public Entity

Advantages

1. Local control and maximum participation in project benefits.
2. Greater ability to integrate project with country's development plans and policies.
3. Lessened foreign economic dominance.
4. Greater control over environmental hazards.

Disadvantages

1. Possible limitations on availability of local capital.
2. Possible scarcity of local managerial know-how.
3. Possible difficult in obtaining of foreign technical know-how.
4. Discouragement of foreign investment in associated industries.

By Private - Local Entity

Advantages

1. Local control and participation in benefits.
2. Greater degree of flexibility than for public operations.
3. Conservations of scarce managerial resources in the public sector.
4. Lessened foreign economic dominance.

Disadvantages

1. Possible limitations of available local capital.
2. Possible scarcity of local managerial know-how.
3. Possible difficulty in obtaining foreign technical know-how.

By Private - Foreign Entity

Advantages

1. Maximum control and participation in benefits by the foreign investor.

2. Better opportunity by foreign investor to integrate new operation with investor's overall operations.
3. Greater willingness of foreign investor to invest.
4. Conservation of capital and managerial resources of the developing country.
5. Ability of private - foreign investor to utilize international information resources.

Disadvantages

1. Vulnerable position of foreign investor with Government and public.
2. Lack of full utilization of local managerial know-how.
3. Lack of full utilization on local marketing know-how.
4. Greater foreign dominance of local economy.
5. Lack of interest in smaller projects.

By Local - Foreign Joint Venture

Advantages

1. Optimal utilisation of foreign and local managerial talents.
2. Improved marketing position of venture.
3. Improved position with Government and public.
4. New venture obtains international information resources of private-foreign operator.
5. Greater employee morale.

Disadvantages

1. Reluctance of some foreign - private companies to invest, particularly in ventures involving public entities.
2. Lessened opportunity of private - foreign investor to integrate operations with overall international operations.
3. Possible problems of managerial control.

Debt Financing

By Public - Local Entity

Advantages

1. Greater ability to integrate project with country's development plans and policies.
2. Lessened foreign economic dominance.

Disadvantages

1. Possible limitations of available local capital.
2. Possible lack of availability of personnel skilled in analysis of petrochemical projects.

By Private - Local Entity

Advantages

1. Greater degree of flexibility than for public operations.
2. Lessened foreign economic dominance.

Disadvantages

1. Possible limitations of available local capital.
2. Possible lack of availability of personnel trained in analysis of petrochemical projects.

By Private - Foreign Entity

Advantages

1. Conservation of financial resources of developing country.
2. Greater degree of flexibility than for public operations.
3. Opportunity to utilise managerial, international marketing and technical know-how of lending entity.

Disadvantages

1. Greater degree of foreign economic dominance.
2. Possible disadvantageous limitations on how funds are to be spent.
3. Possible lack of interest in smaller project.

By Public - Foreign Entity (Bilateral)

Advantages

1. Conservation of financial resources of developing country.
2. Opportunity to utilise project analysis skills of lending agency.

Disadvantages

1. Possible limitation that funds must be spent in donor country and on undesirable terms (additionality, etc.)
2. Greater foreign economic dominance.
3. Possible limited availability of funds.

By Public - Foreign Entity (International Agency)

Advantages

1. Greater ability to integrate project with regional development plans.
2. Conservation of financial resources of developing country.
3. Lessened foreign economic dominance.

Disadvantages

1. Lesser flexibility than for private lender.
2. Possible limited availability of funds.

private Latin American petrochemical investment by U.S. chemical companies:

1. U.S. chemical companies generate on the average about 60 to 70 percent of total / Latin America project capital requirements either locally through retained earnings or raise the necessary capital through established U.S. money sources.
2. The remaining capital requirement, especially the working capital requirements are raised locally by the Latin American subsidiary either internationally or through local banking establishments. The ability to raise this local capital is greatly dependent upon the strength of the guarantees given by the U.S. parent to the obligations of the local subsidiaries.
3. Difficult to expatriate capital in subsidiaries is readily available for reinvestment, but new dollar investment is quite sensitive to the availability of U.S. government guarantees.

Public ownership and financing has also been an important factor in the Latin American petrochemical field. Public ownership, of course, provides for local control and maximum participation in the benefits of the project. It further minimises foreign domination of the developing country's economy. In Latin America, public ownership is to some extent a natural outgrowth of the historical tendency toward government ownership of the petroleum industry.

Publically financed and controlled projects may suffer from the problems of insufficient local capital resources, scarcity of local managerial skills and the possible difficulty in obtaining petrochemical technology. The growth of international sources of long-term borrowings and other long-term sources of non-equity funds have to some extent helped partially to solve the capital availability problem. In addition, an increasing number of basic petrochemical processes have become available through process engineering companies on a "turn-key" basis thus helping partially to solve the technology problem. As the Latin American petrochemical industry progresses, however, demand for modern technology will increase, especially for more sophisticated products, including complex first, second and subsequent generation downstream derivatives. Obtaining this technology may prove far more difficult.

Local private financing of petrochemical projects offers many of the

advantages of publically financed and controlled projects, particularly with respect to the maintenance of local control. Private projects are probably more flexible in nature than public projects, however the latter are more amenable to incorporation into the developing countries overall development plan. Both local private and public projects share common problems with regard to the obtaining of technical know-how and management.

The basic sources of borrowed funds have been noted above. Both public and private sources of borrowed funds in Latin America for petrochemical projects suffer from problems of capital scarcity. Use of these sources, however, to the extent that they are available, tends to make the borrowing country less dependent on outside capital sources. As petrochemical projects are characteristically highly capital intensive, local borrowing must often be used in conjunction with foreign sources of borrowed capital.

Borrowing from foreign sources, as noted, creates a possibility of increased foreign economic domination. The utilization of these funds may, in addition, be based upon the purchase of a specific suppliers equipment or process or the purchase of equipment or services in a specific country, in both situations not necessarily on the most advantageous terms to the borrower in the developing country. Nevertheless, an increasing amount of borrowed funds will be made available in the future through this route. Special note should be made of the growing activities of international private investment groups interested in Latin American petrochemical operations, plus the increasing number of process engineering companies and equipment suppliers ready to advance funds in conjunction with appropriate tie-in arrangements.

Upon considerable reflection the conclusion is reached that as of today no truly ideal method does exist to finance Latin American petrochemical projects, a method which will satisfy the requirements of all interested parties. In our opinion, based upon our observations of the past decade, the local-foreign joint venture involving a wide variety of local and foreign groups represents either the most workable compromise, or at least the most likely future trend. The local-foreign joint venture, on one hand, preserves local independence, and on the other hand, provides the critical foreign capital and technology contribution. An almost equally important factor is that the joint venture combines local managerial and marketing talent, with

international resources in these same areas.

It is most pertinent to mention at this point the most valuable analysis of the principal sources of financing of petrochemical ventures made by UNIDO in connection with the Teheran Petrochemical Conference of 1964.[7] This study revealed that as of 1963, there was an approximately even distribution of existing and planned petrochemical projects in Latin America between ownership based upon wholly, owned foreign capital, joint local-foreign ventures, private locally owned and state owned and/or controlled ventures. The highly suitable nature of the joint venture route was noted, as well as a world-wide recent shift in the joint venture direction.

Our experience in the analysis of Latin American petrochemial projects since 1963 tends to confirm the above findings particularly with respect to the growing importance of joint ventures in Latin American petrochemical projects. Of a sample of 18 projects in Latin America investigated, 14 involved some form of a joint local-foreign partnership. The remaining projects fell into either an acquisition of an existing venture or a direct foreign investment catagory. A particulary significant and encouraging observation is that a large proportion of the projects involved North American manufacturing companies, traditionally inclined, as a whole toward wholly owned and controlled operations. In addition, in many of these projects the foreign company indicated at least an initial and realistic willingness to accept possible partnership with public entities and also a reasonable degree of flexibility with respect to their degree of control.

A number of reasons may be cited for the trends noted above. One possibility is an increasing awareness by the more knowledgeable international corporations of the public relations, managerial and marketing advantages of partnership with Latin American commercial interests. Historically, many North American and European operations in Latin America have been in the extractive industries - petroleum, copper, etc. - and have been orientated toward ultimate markets outside of Latin America. The markets for petro-

---

7) United Nations Center for Industrial Development "Financing of Petrochemical Ventures in Developing Countries". Studies in Petrochemical (Presented at the United Nations Interregional Conference on the Development of the Petrochemical Industries in Developing Countries, Teheran, Iran, 16 - 30 November 1964), United Nations, New York, 1966, Vol.II, PP.933-953.

chemicals, however, are almost entirely within Latin America and hence managerial and public relations factors are of somewhat greater significance.

Another possible explanation is that an increasing feeling of social responsibility exists on the part of international business. These commendable attitudes may be somewhat related to increasing pressure by Latin American governments directed toward the maintenance of local ownership and control. A paralled pressure is that exerted by Latin American industry, rapidly growing in managerial and technical sophistication.

In many Latin American countries, as is well-recognized, control of petrochemical feedstocks rest in State oil enterprises, such as PETROBRAS in Brasil and PEMEX in Mexico. In these instances, a strong pressure can be exerted in the direction of international joint venture arrangements in situations involving potential manufacture of secondary and tertiary downstream petrochemical derivatives.

One factor worthy of mention is the growing interest of chemical companies in Latin American operations. North American chemical companies, facing increasingly mature and saturated U.S. markets and governmental restrictions on West European investment, have been motivated in greater number toward Latin American operations. Historically, chemical companies, particularly North American chemical companies, have been more inclined toward joint venture arrangements or other forms of partnership, both domestically and internationally, than is the case with petroleum companies.

Future Latin American petrochemical ventures will most certainly be characterized by the increasing involvement of public financing organizations and private basically international sources of capital. At present, the Inter-American Development Bank appears to have made the largest total investment in Latin American petrochemical operations among the various international public agencies. To date, the Bank has made loans on 6 projects that may be classified as being petrochemical in nature. These loans involve 5 countries and total $ 40,745,000. For comparison purposes, the Bank in its 7 years of active operations (1961 - 1968) has authorized 498 loans of all types totalling about $ 2.8 billion of which 109 loans totalling about $ 540 million were in the industrial sector.[8]

---

8) "Activities 1961 - 1968" Inter-American Development Bank, Washington, D.C., 1969. 9 Ibid.

A summary of petrochemical projects financed by the Inter-American Development Bank is given in Table IX. Inspection of this table reveals that the largest single project financed was a $ 54 million planned expansion of the Moron fertilizer complex of the Instituto Venezolana de Petroquimica (IVP). In this instance, the Bank has authorized a total commitment in two separate loans to IVP of $ 16.2 million.

In contrast, the smallest project financed by the Inter-American Development Bank in the petrochemical area has been a $ 3.2 million carbon black plant located in Mexico. The Bank in this connection loaned $ 520,000.

In addition to the various projects shown in Table IX the Bank has made indirect contributions to the development of the Latin American petrochemical industry through its industrial credit and preinvestment study programs. For example, National Financiera, S.A. in Mexico has received $ 13 million in partial support of a credit program calling for investments in a wide range of products including foodstuffs and beverages, textiles, metal products, non-metallic ores, machines and chemicals. Funds have also been made available by the Bank in the various countries of Latin America to finance project studies in a wide variety of areas, including petrochemicals.[9)]

Financing by the International Bank for Reconstruction and Development of Latin American petrochemical ventures has to date been limited to a modest number of projects. In the early 1960's, the International Finance Corporation made an investment of approximately $ 4.0 million in Fertilisantes Sinteticos, S.A. (FERTISA), a venture to manufacture ammonia and derivatives in Peru. Of the total IFC investment, slightly more than one - half was subsequently placed with investment houses in France, Switzerland and the U.S.

The IFC has also played a role in the Petroquimica Argetina S.A. (PASA) venture in Argentina, also organised in the early 1960's. In this instance, the IFC purchased $ 3.0 million of 10 year debentures that were found to be unmarketable to the investment community. The IFC investment represented approximately 4.0 % of the total project capitalisation. As a detailed discussion of the PASA project financing is available from the United Nations 1964 study, the reader is referred to this study for fuller details.[10)]

9) Ibid.

10) op. cit.

TABLE VIII

Selected Latin American Petrochemical Operations

Argentina

Existing Operations

1. Cabot Argentina, S.A., Campana-Carbon black, 13,000 tons/yr
2. Carbocolor Industrias Quimicas, Campana-Alcohols, Ketones and Acetates
3. Casco, S.A.I.C., Buenos Aires - Formaldehyde, 13 million lb/yr; urea 6.6 million lb/yr; methanol 50 tons/day.
4. Imperial S.A.I.C., San Lorenzo - Carbondisulfide, 14,000 tons/yr; polyethylene, 14,000 tons/yr.
5. Petronor, Rio Tercero - Phenol, 8,000 tons/yr; methanol, 10,000 tons/yr.
6. Electrochlor, S.A., Rosario - Ammonia, 20,000 tons/yr.
7. Fabricaciones Militares, Rio Tercero - Ammonia and nitric acid.
8. Industrias Petroquimicas Argentinas Koppers, S.A., La Plata - Ethylene, 13,000 tons/yr; polyethylene, 6,900 tons/yr.
9. Monsanto Andes, S.A., Mendoza - Vinyl and polyvinyl chloride, 5,000 tons/yr.
10. Monsanto Argentina, S.A.I.C., Zarate - Polyvinyl chloride, 2,000 tons/yr; polystyrene, 6,000 tons/yr; plasticisers, 1,800 tons/yr.
11. Petroquimica Argentina S.A. (PASA), San Lorenzo - Butadiene, 32,000 tons/yr; styrene, 14,000 tons/yr; synthetic rubber, 35,000 tons/yr; benzene, 800 barrels/day; cis-polybutadiene, 10,000 tons/yr; carbon black, 11,300 tons/yr; other products 11,300 tons/yr.
12. Petroquimica Sudamericana, La Plata - Polyesters 8.000 tons/yr.

Projected Operations

1. Dow Quimica Argentina S.A., Bahia Blanca - Ethylene oxide and derivatives and propylene oxide and derivatives.
2. Union de Empresas Petroquimicas Argentinas, S.A., La Plata - Ethylene oxide, propylene oxide, vinyl chloride and polyvinyl chloride.
3. Electrochlor, S.A., Rosario - Trichloroethylene and carbon tetrachloride.

TABLE VIII - Continued

Brasil

Existing Operations

1. Adesivos Lacticinios Brasil - America (ALBAS/A) Cubatao - Methanol, Formaldehyde and Synthetic resins.
2. Bakol Comercio e Industrial S.A., Sao Paulo - Styrene, 10,000 tons/yr.
3. Cia. Brasileira de Estireno, Cubatao - Styrene, 15,000 tons/yr. and Toluene.
4. Cia. Brasileira de Plasticos Toppers, Sao Paulo - Polystyrene 8,400 tons/yr.
5. Cia. Brasileira Rhodiaceta, Santa Andre - Polyamid resins 3,000 tons/yr.
6. Cia. de Carbonos Coloidais, Mataripe - Carbon black 15,000 tons/yr.
7. Cia. Deodoro Industrial, Sao Paulo - Urea and formaldehyde, 4,500 tons/yr.
8. Cia. Petroquimica Brasileira (COPEBRA), Sao Paulo - Carbon black 27,000 tons/yr.
9. Cia. Petroquimica Nacional (COPERNAL), Sao Paulo - Polyethylene 4,000 tons/yr.
10. Cia. Quimica Rhodia Brasileira, Campinas - Isopropylalcohol 4,000 tons/yr.
11. Clorquim S.A., Caetanodo Sul - Carbon tetrachloride 1,800 tons/yr.
12. Dentaria Brasileira Industria e Comercio, Rua Tito - Acrylic resins 75 tons/yr.
13. Elekiros do Nordeste, Recife - Octylalcohol 3,300 tons/yr. and butanol 330 tons/yr.
14. Fabrica de Borracha Sintetica (FABOR), Rio de Janeiro - Synthetic rubber 40,000 tons/yr; butadiene 33,000 tons/yr; styrene 12,000 tons/yr.
15. Fabrica Inbra S.A. - Industrias Quimicas, Diadema - polyvinyl chloride plastisiens 1,500 tons/yr; phtbalic anhydride 300 tons/yr.
16. Fongra Produotos Quimicos S.A., Sao Paulo - Benzene chloride 1,300 tons/yr; polyvinyl acetate 1,800 tons/yr; benzene dichloride 350 tons/yr; D.D.T. 1,500 tons/yr.
17. Geon do Brasil Industrial e Comercia, Sao Paulo - Polyvinyl chloride 12,000 tons/yr.
18. Industrias Quimicas de Produtos Ptalicos S.A., Sao Paulo - Phthalic anhydride 1,800 tons/yr.
19. Industrias Quimicas Electro-Cloro, Sante Andre - Polyethylene 1,500 tons/yr.

TABLE VIII -- Continued

20. Industrias Quimicas Resenha S.A., Sao Paulo - Maleic anhydride 720 tons/yr.

21. Industrias Quimicas Taubate S.A., Sao Paulo - Polyvinyl acetate 675 tons/yr.

22. Petroleo Brasileiro S.A. (PETROBRAS), Cubatao - Ammonia 27,000 tons/yr; S.B. rubber 40,000; ammonium nitrate [illegible],000; nitric acid 93,000; nitrogenous fertiliser 102,000; ethylene 13,000; carbon black, propylene, benzene.

23. Duque de Caxias, Rio de Janeiro - Butadiene - 33,000 tons/yr.

24. Petrolatos Zilco Ltd., Rio de Janeiro - Methanol and formaldehyde 9,000 tons/yr.

25. Quimica Industrial Brasileira S.A., Sao Paulo - Phenol 3,000 tons/yr.

26. Refinaria e Exploracao de Petroleo "Uniao" S.A., Capuava - Benzene, tetramer, sulfur, ammonia, methanol, higher alcohols, acetylene, vinyl derivatives, carbon black, solvents.

27. Union Carbide do Brasil, Cubatao - Polyethylene 10,000 tons/yr.

28. Vidroplas Companhia Industrial de Plasticos, Sao Paulo - Polyesters 1,200 tons/yr.

Projected Operations - Projects approved by Grupo Executivo da Industria Quimica (Geiquim) 1965-1968

1. Ultrafertil, Cubatao - Nitrogenous fertilizers.

2. Union Carbide do Brasil, Cubatao - Ethylene, acetylene, benzene, polyethylene, vinyl chloride.

3. Petroquimica Uniao, Capuava - Olefins and aromatics.

4. Finiba, Aratu - Acrylonitrile and acrylic fibres.

5. Paskin, Camacari - Ammonium sulfate, acetone, sulfuric acid, methylmethacrylate.

6. Cia. Brasileira de Estireno, Cubatao - Styrene monomer.

7. Petroquisa, Duque de Caxias - Synthetic latex.

8. Petroquisa, Salvador - Ammonia and urea.

9. Prosint, Rio de Janeiro - Methanol.

10. Rhodia, Campinas - Adipic acid, nitric acid, ammonia.

11. Alba, Cubatao - Methanol

TABLE VIII - Continued

12. Ciquine, Camacari - Phthalic anhydride.
13. Eletroteno, Santo Andre - Polystyrene.

Chile

Existing Operations

1. Refineria Chilena de Petroleos y Petroquimica S.A., Santiago - Aliphatic solvents, aromatic solvents, additives.

Projected Operations

1. Dow Chemical Co. - Polyethylene

Colombia

Existing Operations

1. Albonos Colombianos (ALBOCOL), Cartagena - Nitrogenous fertilizers 225,000 tons/yr.
2. Amoniaco del Caribe (AMOCAR), Cartagena - Ammonia 300 tons/day; urea 150 tons/day.
3. Carboquimica S.A., Bogota - Phthalic anhydride 1,000 tons/yr.
4. Empresa Colombiana de Petroleos, Barrancabermeja - Sulfur 30 tons/day; ethylene 35 million lb./yr; propylene 22 million lb./yr.
5. Industria Colombiana de Fertilizantes, Barrancabermeja - Ammonia, ammonium nitrate, nitric acid, urea.

Costa Rica

Existing Operations

1. Fertica S.A., Punta Arenas - Nitrogenous fertilizers 225,000 tons/yr.

TABLE VIII - Continued

El Salvador

Existing Operations

1. Fertica S.A. Acajutla - Sulfuric acid, fertilizers.

Mexico

Existing Operations

1. Cepsa Molina-Pont, Mexico City - Lube oil additives 1 million lb./yr.
2. Derivados del Etileno S.A., Reynosa - Ethylene glycol 18 tons/day; ethanolamines 5.4 tons per day.
3. Fertilizantes del Bajio, S.A. Salamanca - Urea 160 tons/day.
4. Fertilizantes del ISSSTE, S.A., Minatitlan - Ammonium nitrate, urea, nitric acid.
5. Fertilizantes de Occidente, S.A., Guadalajara - Ammonium sulfate 36,000 tons/yr; calcium superphosphate 36,000 tons/yr.
6. Geon de Mexico S.A., Mexico City - Polyvinyl chloride and resins.
7. Halocarburos S.A., Santa Clara - Carbon tetrachloride 4,000 tons/yr.
8. Mexicana de Fenol S.A., [illegible] - Phenol 14 tons/day.
9. Negromex S.A., Salamanca - Carbon black 40 tons/day.
10. Petroleos Mexicanos, Atzcapotzalco - Sulfur 15,000 tons/yr; dodecylbenzene 33,000 tons/yr; methanol 40 tons/day.
11. Petroleos Mexicanos, Coatzacoalcos - Ammonia 200 tons/day.
12. Petroleos Mexicanos, Tampico - Sulfur 13.150 tons/yr; toluene 11,000 tons/yr; alkylbenzene 11,000 tons/yr; dodecylbenzene 70 tons/day; butadiene 84 tons/day; styrene 82 tons/day.
13. Petroleos Mexicanos, Minatitlan - Benzene 65,000 tons/yr; toluene 122,000 tons/yr; xylenes 72,000 tons/yr; ammonia 200 tons/day; carbon-dioxide 250 tons/day.
14. Petroleos Mexicanos, Salamanca - Ammonia 200 tons/day.
15. Polyrey Ltd., Reynosa - Polyethylene 30 tons/day.
16. Polyquimica S.A., Mexico City-2, 4-D 800 tons/yr; pentachlorophenol 800 tons/yr.

TABLE VIII - Continued

17. Salicilatos de Mexico S.A., Mexico City - Benzoic acid 1,000 tons/yr.
18. Sintesis Organica, Mexico City - Phthalic anhydride 5,000 tons/yr.
19. Tetraetilo S.A., Coatzocoalcos - Tetraethyl lead 16,500 tons/yr.

Peru

Existing Operations

1. Corporacion de Reconstruccion y Fomento, Cuzo - Ammonium nitrate 70,000 tons/yr.
2. Fertilizantes Sinteticos S.A., Lima - Ammonia 200 tons/yr; ammonium sulfate 20,000 tons/yr; ammonium nitrate 32,500 tons/yr.

Trinidad

Existing Operations

1. Federation Chemicals Ltd., Point Lisas - Ammonia, ammonium sulfate, urea.
2. Texaco Trinidad Ltd., Pointe-à-Pierre - Cyclohexane, di-isobutylene, propylene trimer, propylene tetramer, benzene, toluene, naphthetic acids, normal paraffins.

Venezuela

Existing Operations

1. Instituto Venezolano de Petroquimica (IVP), Moron - Ammonia 33,000 tons/yr; ammonium nitrate 49,830 tons/yr; ammonium sulfate 79,800 tons/yr; urea 16,000 tons/yr, polyethylene, polyvinyl chloride, synthetic rubber, dynamite.
2. Negroven Bosco, S.A., Moron - Carbon black 3,000 tons/yr.

TABLE VIII - Continued

Projected Operations

1. Quimica Venoco, Valencia - Dodecylbenzene 15,000 tons/yr.
2. Corporacion Venezolana de Petroleo (CVP), El Tablazo - Propylene 5,800 barrels/day; butane 3,400 barrels/day; natural gasoline 2,430 barrels/day, ethylene 10.5 MM cubic feet/day.
3. Unicar Petroquimica, La Tablazo - Low density polyethylene 50,000 tons/yr.
4. Colombo-Venezolano de Nitrogeno (COVENITRO), La Tablazo - Ammonia 330,000 tons/yr; urea 440,000 tons/yr.
5. Venezuelan Industrial de Nitrogeno (NITROVEN), La Tablazo - Ammonia 300,000 tons/yr, urea 500,000 tons/yr.
6. IVP-Commonwealth Refining Co., La Tablazo - Ammonia, aromatics, benzene, toluene, xylene.
7. IVP-Goodyear, La Tablazo - Synthetic rubber.

Sources: International Petroleum Register (20th Edition), Mundo Economico, Vino, Quimicos e Derivados, Chemical Week.

TABLE IX

Latin American petrochemical projects with support by the Inter-American Development Bank

Borrower	Description	Loan amount (Dollars US)	Total cost (Dollars US)
	Argentina		
Carbocolor Industrias Químicas S.A.I.C. (1963)	Plant at Buenos Aires for manufacture of petrochemical products, for surface coatings and pharmaceuticals	2,500,000	10,220,000
Petrosur, S.A. Industrial y Comercial (1965)	Fertilizer complex at Campana including ammonia unit	10,025,000	21,050,000
	Chile		
Empresa Nacional de Petroleo (ENAP) (1967)	Ethylene plant at Concepcion to supply petrochemical complex	6,900,000 a/	15,900,000
	Colombia		
Polioleofinas Colombianas, S.A. (1967)	15,000 ton polyethylene plant at Barrancabermeja	5,000,000	10,100,000
	Mexico		
Negromex, S.A. (1963)	Carbon black plant at Salamanca	500,000	3,000,000
	Venezuela		
Instituto Venezolano de Petroquimica (IVP) (1968)	Expansion of fertilizer complex at Moron	16,800,000	34,000,000

a/ Bank has also granted CORFO 6 loans totalling $ 39.9 million to provide credit to private enterprises, including petrochemical ventures to utilize ethylene produced by ENAP.

Source: "Activities 1961-1968" Inter-American Development Bank, Washington, D.C., 1969.

More recently, the IFC has participated in the financing of the Petroquimica Uniao project in Brazil. In this project, IFC is taking both an equity position and a position as a long-term creditor, $ 2.4 million and $ 2.5 million respectively. This project is also discussed in some detail in a subsequent section.

Of increasing importance are the activities of private investment companies and groups in Latin America. An increasing number of such organisations exist ranging from long-established organizations, such as the Chase International Investment Corporation, (CIIC), to relatively new organisations, such as the Adela Investment Company, S.A.

Although CIIC has yet to complete an implemented petrochemical project, a detailed description of its activities is important. Conversations with CIIC officials reveal that considerable attention is now being paid to the petrochemical area and that a keen interest exists in potential petrochemical investments, particularly in Latin America. The activities of CIIC can be summarised as follows:

1. The financing of private sector projects in developing countries on both a lending and equity basis.
2. Providing counsel on the design and implementation of private sector projects.
3. The arranging of the overall project investment package, including the placement of portions of the obligations of the enterprise with private overseas investors and with various governmental agencies and international financing organisations.

CIIC appears quite flexible in its investment policies. Each potential project is examined on its merits and implemented projects vary greatly in financial characteristics. The following, however, describes the general approach:

1. Projects must be well-conceived and based on sound economics. Promoters of new projects are requested to furnish answers to a very comprehensive ten item checklist encompassing such important areas as management, markets, production factors and project economics. A copy of this checklist is provided through the

courtesy of CIIC as Exhibit II. In general, projects based upon possibly ephemeral tariff and taxation arrangements are not well-received.

2. CIIC's participation in any project is generally limited to the $ 500,000 to $ 2 to $ 3 million range. The lower limit, which is quite immaterial to petrochemical projects, has been established to conserve managerial time and expense. The upper level represents the desire to maintain proper portfolio diversification with respect to projects, industry sectors and countries. In situations, particularly petrochemical projects, where capital requirements are obviously larger than the upper level, CIIC acts as an agent in obtaining additional partners.

3. In general, prospective investments must yield a minimum 15 - 20 percent return on investment based upon discounted cash flow calculations. The rate of return is obviously subject to consideration of the investment risk involved, as well as prospects for the growth of the enterprise, the opportunity for capital gains and such "fall-out" as possible commercial banking business and public relations values. It is probably a fair statement to say that CIIC's investment criteria tends to be more generous than that of the typical private U.S. chemical manufacturer for which a 25 percent return is probably desired.

4. Although there is no set rule, CIIC anticipates that about 60 to 70 percent of the total investment package will be put up by the overseas investors (CIIC plus investors obtained by CIIC). The remaining investment is provided by the technical sponsor, the local investor(s) and possibly governmental support. An important requirement is that both the technical sponsor and the local investor have a significant financial investment in the project. This requirement is to insure that the technical sponsor and the local investor have a sufficient interest and financial involvement in the project in order to insure a keen level of active responsibility with respect to the success or the project. Investment at the level of $ 500,000 would be considered inadequate in a petrochemical project on the part of the technical sponsor and the local investor.

Exhibit IV

OICC Checklist for Project Investments

1. The Company to be Financed
   a) Describe the (proposed) company, its capital structure, location and nature of major activities. Give biographical notes of promoters, principal stockholders, directors, management and bank references. If going concern, submit current balance sheets, earnings statements, financial history.

2. The Project to be Financed
   a) Describe the project: Is it an expansion, modernization or a new undertaking? State and describe costs of plant and equipment. Describe products, their economic justification and contributions to the host country, i.e., what will make it welcome in the host country? (Will it generate dollar income, save foreign exchange, utilize local raw materials or local labor?)

3. Management
   a) State what experienced corporate entity will construct and operate the plant, its competence and foreign experience.
   b) What local independent professional services will be used (lawyers, accountants, engineers, marketing experts, etc.)?

4. Raw Materials and Labor
   a) List raw materials, source and cost. May they be freely imported?
   b) What are labor requirements: Local and expatriate, skilled and unskilled? What provision for training and advancing local labor?

5. Markets
   a) State projected demand and sales for next five years. What is the statistical basis of the projections? Where imports or exports are part of the market show quantities and value by country.
   b) What is the competition, domestic and foreign?
   c) Are there import restrictions, duties, or other government regulations which may affect sales either in the host country or export markets? Does the company have long-term sales contracts?

6. Operations and Financial Results

a) Submit:

1. Projections of output, costs, revenues, taxes and profits for at least the first three years of operations or for the period foreign debt will be outstanding. State construction and start-up time. (Cost items should include raw materials, labor, power, administrative expense, sales expense, depreciation and taxes.)
2. Cash flow statement, showing source and disposition of funds during construction and for period corresponding with a) above.

b) What provision is made for overruns in construction and start-up costs?

7. Government Environment

a) What role will government have in the project?

b) What incentives will it offer? What is government policy regarding repatriation of profits, dividends, interest and capital, entrance and residence of foreign technicians and other factors which may effect the project?

8. Taxation

State the effective rate of taxation, giving details of each tax, its rate and any tax preferences.

9. Capital Requirements and Financial Plan

Show in detail by source and currency how minimum capital needs will be met; include working capital and interest during construction. State efforts, if any, made to raise the required capital and approaches made to potential lenders and investors.

10. Independent Studies

If independent technical, cost, market or other studies have been made, submit these; if none made state that such arrangements will be made.

5. As CIIC projects are directed toward the objective of stimulating private investment, investment is not made in projects subject to governmental control, although governmental participation on a minority basis is possible.
6. CIIC does not establish a set ratio between debt and equity in any project. The breakdown between debt and equity for any project is a function of the conditions of the project and the investment realities, often a function of the short-run investment climate. It may be said, however, that some degree of equity participation is essential as participation on a debt basis alone would not be economical considering U.S. taxation policy and the cost of money. Some debt is also desirable in order to allow a cash flow, during the early years of the project, sufficient to cover the main elements of managerial expense. The fine details of the investment package are quite dependent upon the nature of several prospective participants. Insurance companies, for example, are quite passive and conservative investors due to tradition and legal restrictions. U.S. insurance companies have generally limited their overseas investment to hotel and land deals rather than industrial projects. Under these circumstances, the preference is toward well-secured and guaranteed debt obligations. Mutual funds, with an investment policy of growth and capital appreciation, are far more aggressive.
7. Due to a policy of portfolio revolvment, CIIC aims for a liquidation of its equity position in a period of five to ten years. Liquidation allows CIIC to obtain a capital gain with respect to U.S. tax law and, of course, promotes local control and participation.
8. Voting control in the new enterprise is not required, however, an effort is made to obtain a role in the management of the venture.

It is important to note from conversations with CIIC officials, that investment criteria for Latin American petrochemical investments do not differ significantly from petrochemical investments in other parts of the world or from investments in other capital intensive industries, such as the steel industry, for example. The following points, however, appear to be significant.

1. Latin American petrochemical projects are expected to be sound, perhaps sounder than projects in the U.S. The potential market size must be sufficient to support economical production. Market prospects must be based upon a very realistic appraisal of opportunities in downstream petrochemical derivatives, including a very critical approach to prospects based upon future regional integration.
2. Where US or European investors are operating through Latin American subsidiaries, the obligations of local subsidiaries are expected to be sufficiently protected by the parent companies.
3. Performance guarantees are important, particularly regarding the problems project overruns. Ideally overruns which are very common in petrochemical projects, should be reflected in an equity position.

Also potentially very significant are the activities of Adela Investment Company, S.A. This company, founded in 1964, pools the resources of over 100 North American, European and Japanese banks, manufacturing corporations and investment companies, with the objective of investing in Latin American industry. To date, Adela's investments in petrochemicals has been limited. An equity investment of $ 200,000 has been made in Companhia de Industrias Quimicas do Nordeste S.A. (CIQUINE). This company, a new private venture, is constructing a phthalic anhydride plant at Camacari in the Brazilian Northeast, a location eligible for the very advantageous SUDENE benefits.

Adela is also involved in a borderline petrochemical project, Polimeros Centroamericanos S.A. (POLICASA). In this case, Adela has made an investment of $ 167,000 in a polyvinyl chloride plant at Managua, Nicaragua. The plant will utilise imported monomer.

An especially significant recent example of the activities of a private international group in the case of Comptoir Industriel et Agricole Ventures l'Etranger (CIAVE), a group that has played an important part in the Brazilian Petroquimica Uniao project. The CIAVE group, French in origin is supplying 50 percent of the total equity, all on a debt basis. The contribution is significantly tied to the purchase of equipment and services in France.

In concluding consideration of the activities of private investment groups, a few final observations, from the point of view of developing country project initiators are in order. These organizations clearly will grow in importance in the future as major sources of project funds on generally reasonable terms. In addition to financing, these sources will provide important contributions to project management and know-how. Care will have to be taken to avoid possibly undesirable tie-in arrangements on the purchasing of equipment and services. A choice will have to be made between such organizations as Adela, which offer a very broad range of potential co-investors (through its widely distributed ownership) and CIIC which offers a narrower, but perhaps more individually tailored investment packaging capability.

Final mention, in connection with financial sources, should be made of the growing opportunity in Latin America for the reinvestment of retained earnings from petrochemical ventures. Retention of earnings has represented one of the most important sources of financing of the North American chemical industry, the classic example being that of E.I. du Pont. Retained earnings offer many advantages, not the least of which is the independence of the venture from the control of external financing organizations.

Unfortunately, retained earnings, as a significant source of funds for the financing of developing country petrochemical ventures can not be listed in Part I, in view of its premature applicability to Latin America. Well-conceived projects, such as Petroquimica Unica, combined with a growing Latin American economy, should open up the possibilities of this route, hopefully in the near future.

Case Profiles

We present here several case profiles which, together, illustrate the various points made in the previous discussion. First we describe briefly a project in which Interamer Research was not involved, Petroquimica Unica, because it illustrates what can be achieved through a combination of careful planning and efficient execution. The other case profiles are drawn from our own experience over the past six years. One project succeeded, and one remains to be finally implemented.

Case I - Petroquimica Unica

This project was originally conceived more than five years ago: today it is being implemented. The formation of Petroquimica Unica marks the beginning of "what should well become the largest petrochemicals complex in Latin America".[11] The initial investment for this complex will be about 71 million dollars, but additional ventures by others to utilize the production of the mother facility should eventually swell the total investment of Unica and its customers to several hundreds of millions.

The Petroquimica Unica complex is to be located at the site of Refinaria Unica's Capuava refinery. One of the later presentations will deal with the plans of Petroquimica Unica in detail, but it is pertinent here to give an outline of the scope of the project.

The initial complex will produce 700,000 metric tons per year of products for its own use and for sale to customers.

The profile of these products is as follows:

---

11) "Petroquimica Pondera Entraves Lenemdos", Visao (Rio de Janeiro, 31 January 1969) pp 130-135

- Ethylene	137,000 tons
- Propylene	100,000 "
- Butadiene	31,000 "
- Hydrogen	4,000 "
- LPG	96,000 "
- Naphtha	19,000 "
- Benzene	120,000 "
- Ortho-xylene	28,000 "
- Para-xylene	16,000 "
- Solvents	43,000 "
- Aromatic residues	60,000 "

It is obvious that a host of petrochemical derivatives can be made from this output, but we will not go into them here.

Of the total initial capital requirement for this project, $ 70 million, equity capital represents $ 24 million of the total, with the remaining 46.5 million having been raised as debt capital, a major part of it tied in with commitments to purchase equipment and engineering services in Europe.

The capital structure of Petroquimica Union, as it is presently structured, breaks down as follows:

Equity Capital

Petroquisa S.A.[a]	$ 6.0 million	(25 %)
Refinaria Union	6.0 million	(25 %)
Cia. Sao Fernando[b]	6.0 million	(25 %)
Cia. Brasileira de Participacoes[c]	3.6 million	(15 %)
International Finance Corporation	2.4 million	(10 %)
total equity capital	$ 24.0 million	

---

a) Petrochemical subsidiary of Petrobras S.A.

b) Walter Torreira Salles group

c) Port Igel group

Debt Capital		
CIAVE [4]	:	40.5 million
IFC		2.5 "
Investbank		3.5 "
total debt capital	:	46.5 million
Total Capital Investment	:	70.5 million

It will be seen that the project is moderately leveraged, with the equity representing 34 percent of the total capital inputs, and debt financing 66 percent. It is further interesting to note that 57.5 percent of the total input, that offered by CIAVE, commits acquisition of equipment and engineering in France. (The engineering and construction contract has been let to Societe Francaise des Techniques Lummus.)

---

4) Leader of French financing pool, Banque de Paris largest participant.

Case 2 - An Implemented Project

Financing a petrochemical venture by a company having an existing operation in a Latin American country is in some ways made easier, since a record of successful operations in the country makes debt capital often easier to raise, and because, in most cases, retained local earnings are available to support a portion of the new investment. (In this case we must disguise dates, products, amounts, and country to provide anonymity of the company involved: because of the small number of existing petrochemical operations in the area to do otherwise expose the identity of the project).

Ocean Chemical International (OCI) built its original plant in San Pedro in 1950 at a cost of $ 30 million. Its joint venture partner, Chemo San Pedro S.A. contributed 20 % of the equity, most of the money having been borrowed. For OCI, a moderate-sized overseas chemical company, this was its first venture in Latin America. Happily, it was a good one: by 1963, as the result of encouraging the development of downstream industries, the plant was sold out, and excess committments were being honored by imports to augment production. With the market continuing to grow, it was clearly past time to consider building new capacity. It was decided therefore to double the capacity of the existing plant and, at the same time, to include facilities for the production of 3000 tons per year of a sister product, demand for which was being satisfied by other means through imports.

Engineering studies showed that the total cost of the new plant would be $ 21 million, $ 3 million more than previous experience would have indicated. Still, OCI calculations were favorable, and it was decided to proceed.

OCI, having another project underway elsewhere, and already having committed a major part of its capital to San Pedro, determined to invest itself only $ 6 million to the project, on the condition that it could borrow that amount and that its partner Chemo would put up a matching 1.3 million, making a total of $ 7.3 million, or 35 % of the required investment capital. In addition, OCI, S.A., the local operating company in San Pedro, had accumulated $ 3.2 million in retained earnings, and it was mutually agreed by the partners to earmark this fund for the new project. Thus the available internal investment capital for the project was $ 10.5 million, or 50 % of the total amount required.

As the result of conversations with suppliers around the world, equipment loans of $ 7.2 million were negotiated. An additional $ 1.5 million of equipment-purchase loans from North America was turned down because of unfavorable terms. Thus by late 1964, only $ 3.3. million of the required investment remained to be raised.

A major international investment bank was contacted, and expressed interest in providing the remaining amount, but prefferred taking half as equity capital. This could not be worked out to the satisfaction of the three parties, and the negotiations were temporarily adjourned. In the meantime, a re-assessment of the engineering cost study suggested that the total project cost would actually be slightly over $ 22 million, because of increases in the prices of stainless steel, special equipment, and process-control equipment.

Negotiations were reopened with the bank in 1965, but after a number of meetings, the situation still had not been resolved. A subscription through local banks in San Pedro was considered, but rejected. By this time, however, the retained earnings of OCI, S.A. had risen to $ 4.6 million, and Ghana especially was pressing for some sort of action: either invest the earnings or pay them out. In the end OCI arranged for an issue of debentures, and at last the go-ahead was given for construction of the plant.

Case 1 - A Project under Implementation

An opportunity has existed in a major Latin American country for the manufacture of an important second generation petrochemical derivative of the aromatic type. This product possesses important markets in the pharmaceutical field, plus other uses. No current production of this product exists and imports are costly. There is a good raw material position because of the final events of the previous case.

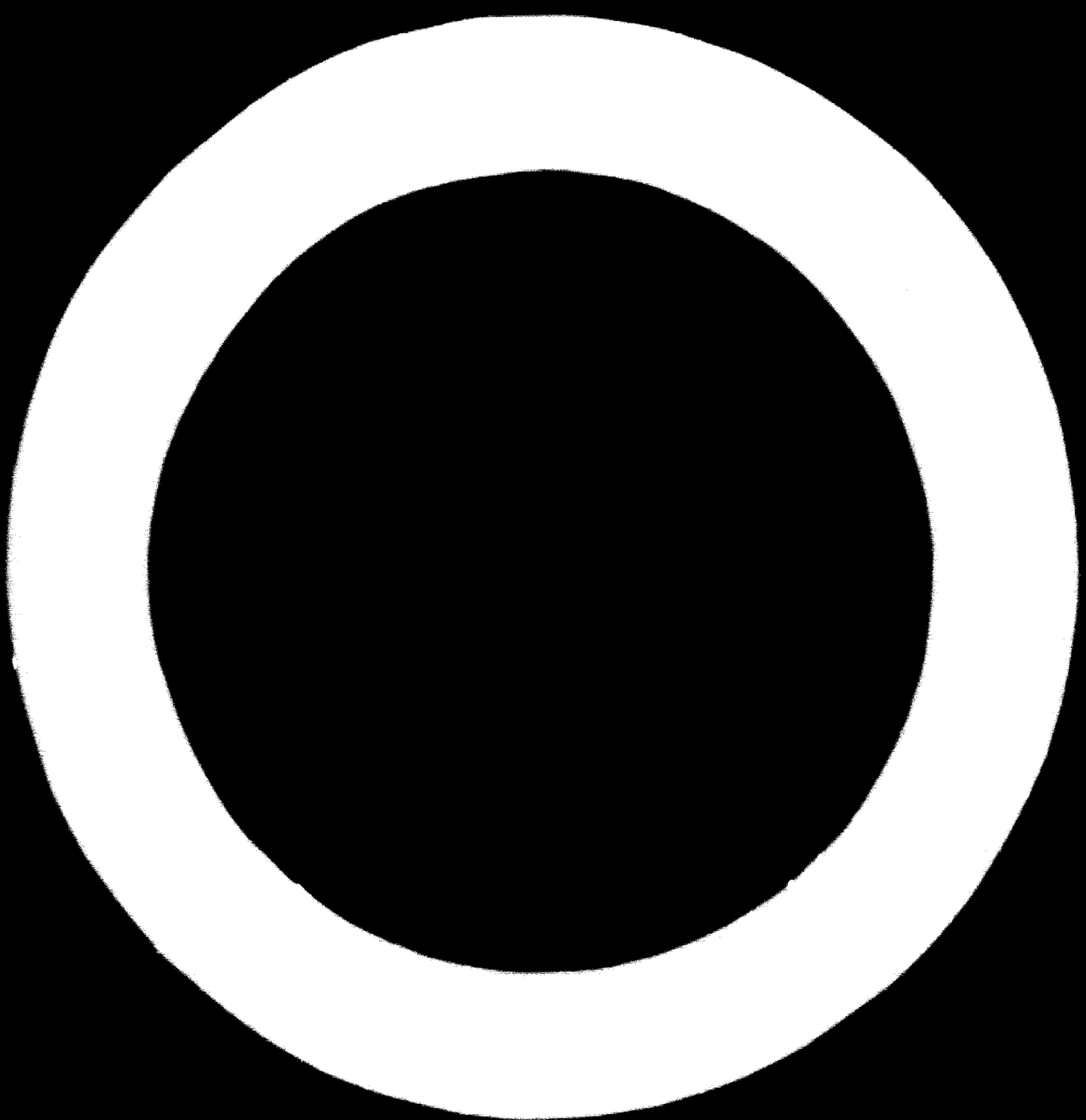
A small project promotion group has attempted to implement the opportunity. One major international conglomerate type organization, with chemical interests, closely allied to this product, has turned down the opportunity due to doubts about the country and the current world-wide capital situation and fear that own process may not be competitive (an alternative process exists). The project promotion group is continuing its efforts and now has an initial commitment from an important venture capital company.

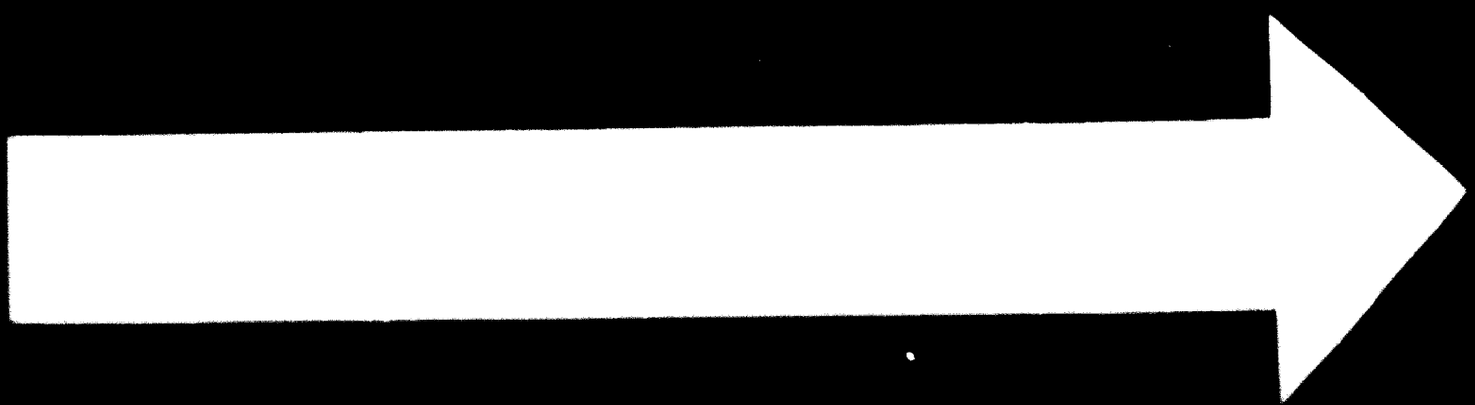
The estimated total investment in this project is about $ 20.0 million. Of this figure, approximately 25 percent or $ 5.0 million will be raised locally. The local investment will be provided about 50 percent by a local group and the remainder from public sources. Of the remaining $ 15.0 million, about $ 10.0 million will be provided by the venture capital company and the remainder will be obtained from other overseas sources.

ANNEX

Details of Latin American petroleum production

Country	Name of field and discovery date	Depth (ft)	No. of wells Flowing	No. of wells Pumping	No. of wells Shut-in	Production in bbl Daily avg. 1968	Production in bbl Cumulative	Gravity API
Argentina	Chubut, 1907	2,900- 6,000	14	1,103	87	54,128	421,614,706	.....
	Mendoza, 1924-1958	7,500	2	810	74	108,212	272,950,493	.....
	Neuquen, 1918	1,600- 5,000	49	233	35	18,606	107,541,057	.....
	Rio Negro, 1960	2,900- 5,000	198	180	78	46,955	35,231,353	....
	Salta, 1930	11,000-14,000	68	11	27	11.574	66,010,342	....
	Santa Cruz, 1944	2,900- 6,500	224	2,047	279	98,331	325,191,994	.....
	Tierra del Fuego, 1958	6,000	9	20	17	5,460	29,446,905	.....
	Total		564	4,404	597	336,276	1,257,986,860	
Bolivia	Camiri, 1957	3,937	32	47	...	5,500	39,788,229	55.0
	Caranda, 1960	3,700- 6,700	48	...	7	28,558	17,740,727	50.0-63.
	Colpa, 1961	5,200	11	...	11	4,887	3,456,007	42.0-46.
	Vaturenda, 1964	1,801	12	5	...	1,000	1,851,867	
	Others		15	42	...	975	355,875	
	Total		118	34	18	40,920	63,192,705	
Brazil	Agua Grande, 1951	4,092-4,680	66	40	56	36,985	166,266,168	40.0
	Candeia, 1963	8,200-4,092	19	...	3	2,651	1,141,352	44.0-41.0
	Carmopolis-Sanbaroma, 1960	4,265	...	6	...	394	959,615	31.5
	Itanhem, 1959	2,772	...	82	5	19,913	40,193,037	35.0
	Itanhem, 1941	4,224-7,095	8	37	32	7,603	50,428,987	38.8
	Guanabara, 1963	2,310	4	105	69	20,287	8,797,949	25.0
	Guaricema, 1959	5,148	...	16	9	970	2,407,705	31.0
	Sao Joao, 1947	891-1,115	95	223	179	13,210	36,189,515	37.6
	Taquipe Sao Esperanca, 1966	8,000	3	...	1	846	679,974	38.0





24. I. 72

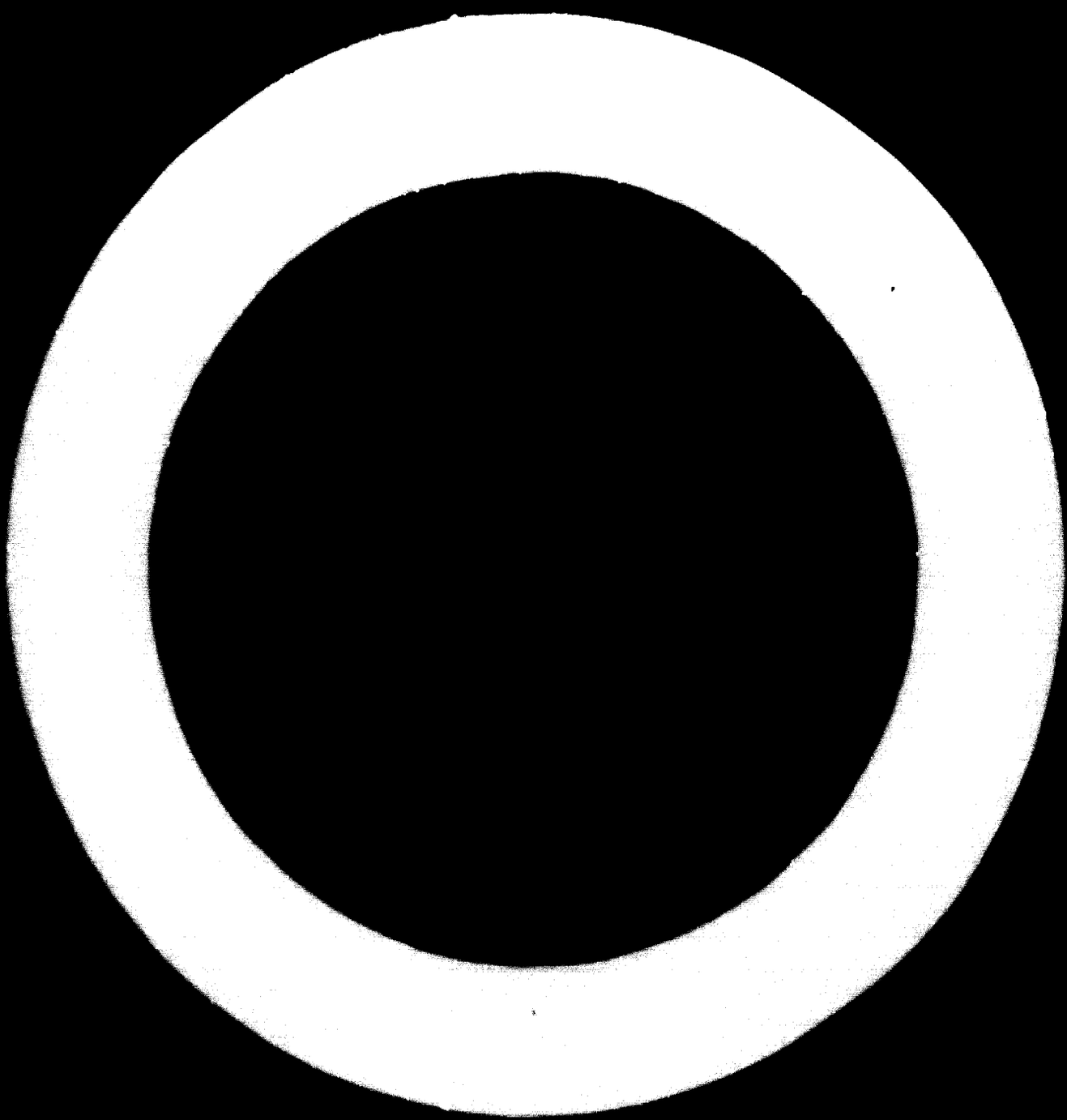
2 OF 2

DO

0341

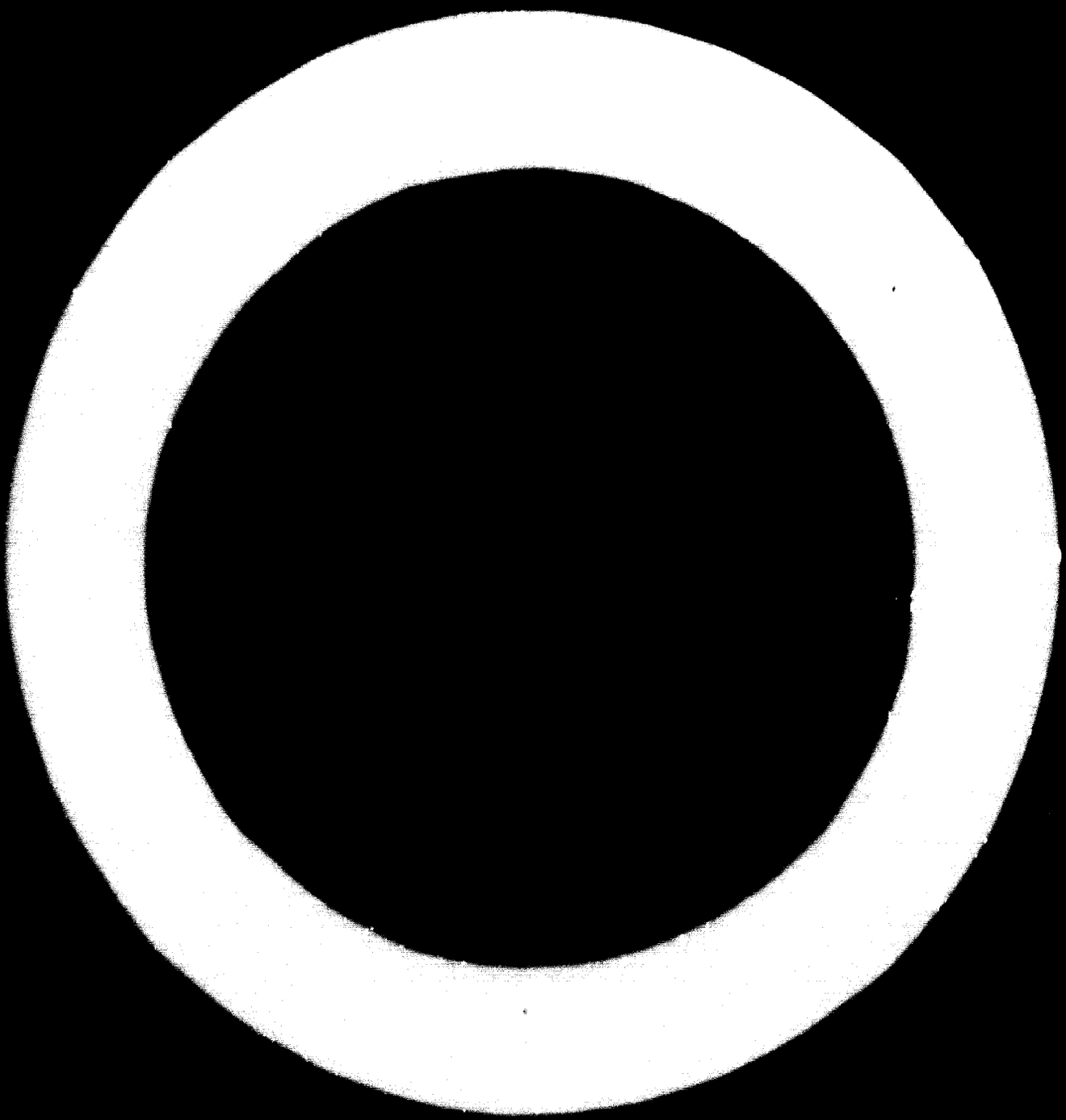
APPENDIX - Continued

Country	Name of field and discovery date	Depth (ft)	No. of wells Flowing	Pumping	Shut-in	Production in bbl Daily avg. 1st6mos. 1968	Cumulative	Gravity API
Brazil	Fazenda Imbi, 1964	3,200	13	...	4	2,692	2,005,636	43.0
	Fazenda Panelas, 196.	4,290	1	1	1	762	1,904,084	36.8
	Massapo, 1964	8,038	1	...	3	434	600,607	38.8
	Mata do Cão Jose, 1951	4,092	2	14	12	621	5,092,648	40.0
	Miranga, 1955	1,968-4,265	65	...	27	29,545	30,079,554	40.0
	Riachuelo, 19..	1,640	6	5	16	284	69,869	20.0
	Santana, 1962	5,676	4	1	6	264	2,009,775	36.9
	Sirizinho, 1967	1,476	3	...	4	298	54,471	30.0
	Tabuleiro dos Martins, 195.	2,050-3,521	...	20	4	433	622,194	20.0-30.0
	Taquipe, 1959	3,356-4,257	21	45	11	9,538	36,770,868	36.0
	Others	...	3	3	61	319	2,757,683	.....
	Total		331	539	503	158,170	389,031,696	
	Tierra del Fuego							
Chile	Calafate, 1955	6,200	17	2	...	3,778	7,044,100	49.0-60.0
	Catalina Sur, 1960	5,890	8	6	...	3,219	2,480,085	43.0
	Chanarcillo, 1950	7,550	11	...	...	771	5,608,524	58.0
	Cullen, 1951	5,840	27	16	...	4,614	27,498,638	41.0
	Lynch, 1950	6,480	7	...	...	731	1,078,288	41.0-51.0
	Sombrero, 1950	7,380	12	1	...	738	11,760,751	39.0
	Tres Lagos, 1957	5,640	16	1	...	2,153	6,604,167	40.0
	Tres Lagos Sur, 1963	5,740	7	1	...	1,540	2,133,529	39.0
	Victoria Sur, 1950	7,640	9	...	...	559	5,749,472	40.0
	Mainland							
	Cunadon, 1962	6,560	16	4	...	3,895	4,456,508	38.0
	Daniel, 1960	5,970	37	10	...	4,524	16,256,596	32.0
	Daniel Este, 1961	5,740	14	...	...	4,064	9,944,851	32.0
	Posesion, 1960	6,100	29	...	...	3,371	7,704,649	63.0
	Delgada Este, 1959	7,540	5	3	...	651	2,030,305	36.0
	Others		33	21	...	2,577	16,622,683	.....
	Total		249	65	...	37,263	126,973,145	



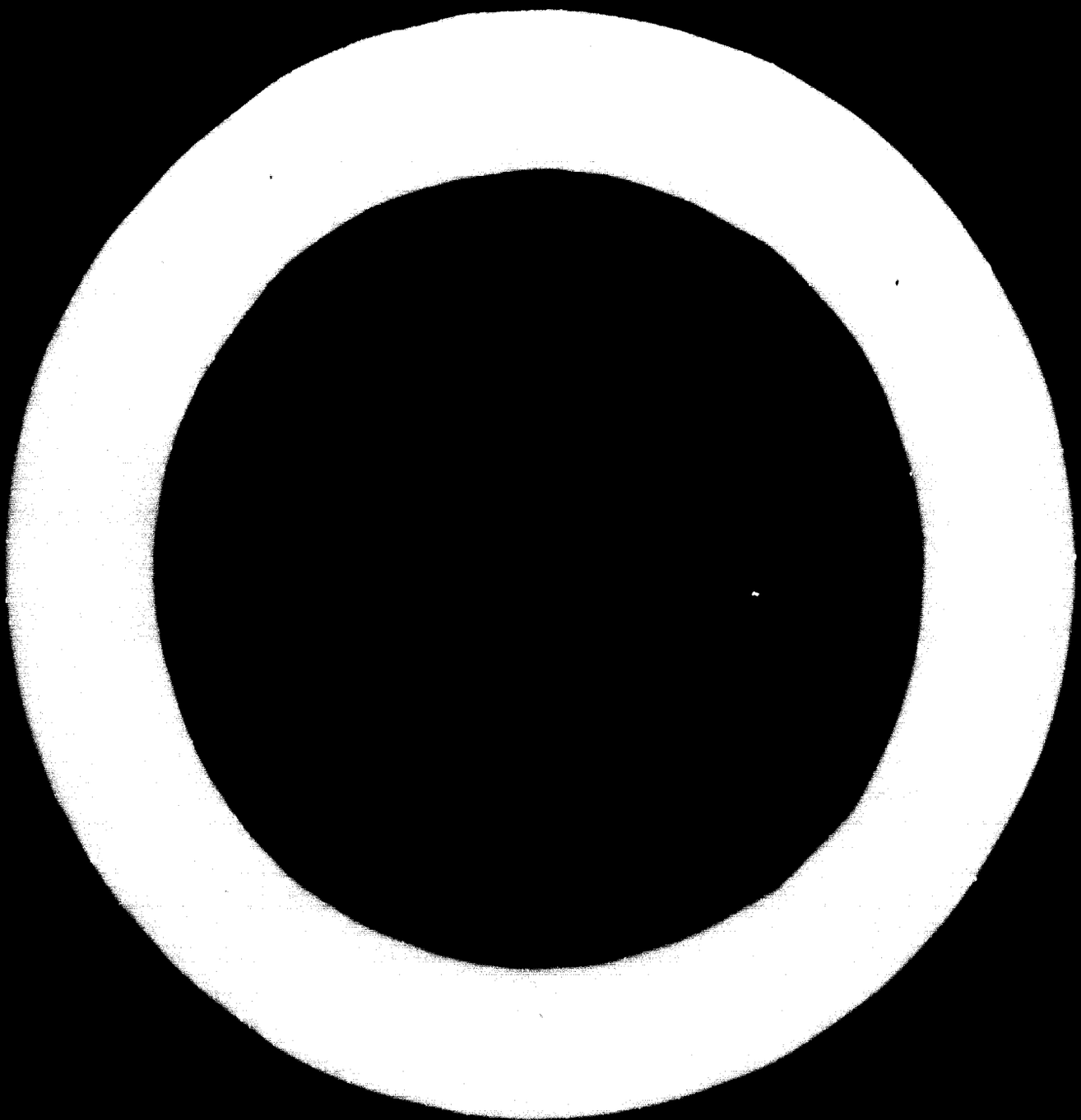
APPENDIX - Continued

Country	Name of field and discovery date	Depth (ft)	No. of wells Flowing	Pumping	Shut-in	Production in bbl Daily avg. 1st6mos. 1968	Cumulative	Gravity API
	Bonanza, 1964	3,000-5,000	1	5	2	1,583	1,622,305	21.
	Boquete, 1961	8,000	4	...	1	1,445	4,713,096	44.
	Cantagallo, 1953	4,225-7,360	4	6	1	977	12,424,783	20.
	Casabe, 1941	2,140-5,660	...	332	55	9,222	185,760,547	20.
	Cicuco, 1956	8,000	10	...	8	2,013	39,413,932	45.
	Cira, 1925	1,500-3,250	4	754	10	18,728	369,198,396	21.0
	Cocorna, 1965	1,600-2,400	...	8	1	579	555,138	12.
	Colorado, 1925	1,000-3,750	19	21	10	729	4,904,659	41
	Corazon, 1963	8,100	5	...	2	940	2,654,533	34.
	El Conchal, 1960	7,000-9,000	2	3	...	1,864	6,444,937	32.
	El Limon, 1963	7,200-8,000	4	...	3	3,882	10,094,681	36.
	El Roble, 1960	7,000-10,000	12	2	1	17,403	37,895,997	35.
	Ermitano, 1955	5,600	...	9	6	454	2,309,862	16.
	Galan, 1945	3,500-6,400	3	51	19	1,413	12,080,921	19
Colombia	Infantas, 1918	1,000-2,500	1	318	4	4,279	199,446,969	21.0
	La Cristalina, 1959	10,700-11,000	...	2	...	851	1,991,070	30.
	Lizama, 1967	9,500	7	3	1	1,756	973,199	33.
	Llanito, 1955	5,600-7,500	3	24	6	2,031	5,666,506	19.0
	Neiva, 1962	2,000-3,800	1	2	1	787	1,335,966	19.
	Ortega, 1951	5,000	...	6	2	1,094	7,690,389	27.
	Palagua II, 1954	4,000	...	114	26	9,127	37,873,697	15.
	Payoa, 1962	10,000	15	6	5	12,501	36,321,122	34.
	Penas Blancas, 1958	5,175-7,345	...	6	1	941	4,799,909	29.
	San Pablo (Yariqui), 1955	7,600-2,000	1	22	2	11,749	51,275,884	19.
	Sagamoso, 1957	10,000	...	2	...	793	436,708	27.
	Tibu, 1942-1957	500-8,100	8	175	19	18,188	168,803,759	32.9
	Tisquirama, 1963	8,600	...	6	...	928	921,072	24.
	Velasquez, 1946	4,700-6,000	...	122	46	17,213	106,740,862	23
	Zulia, 1961	5,600	17	1	4	33,699	45,500,998	41.
	Others		2	19	10	287	2,273,703	
	Total		128	2,055	246	177,456	1,362,125,650	



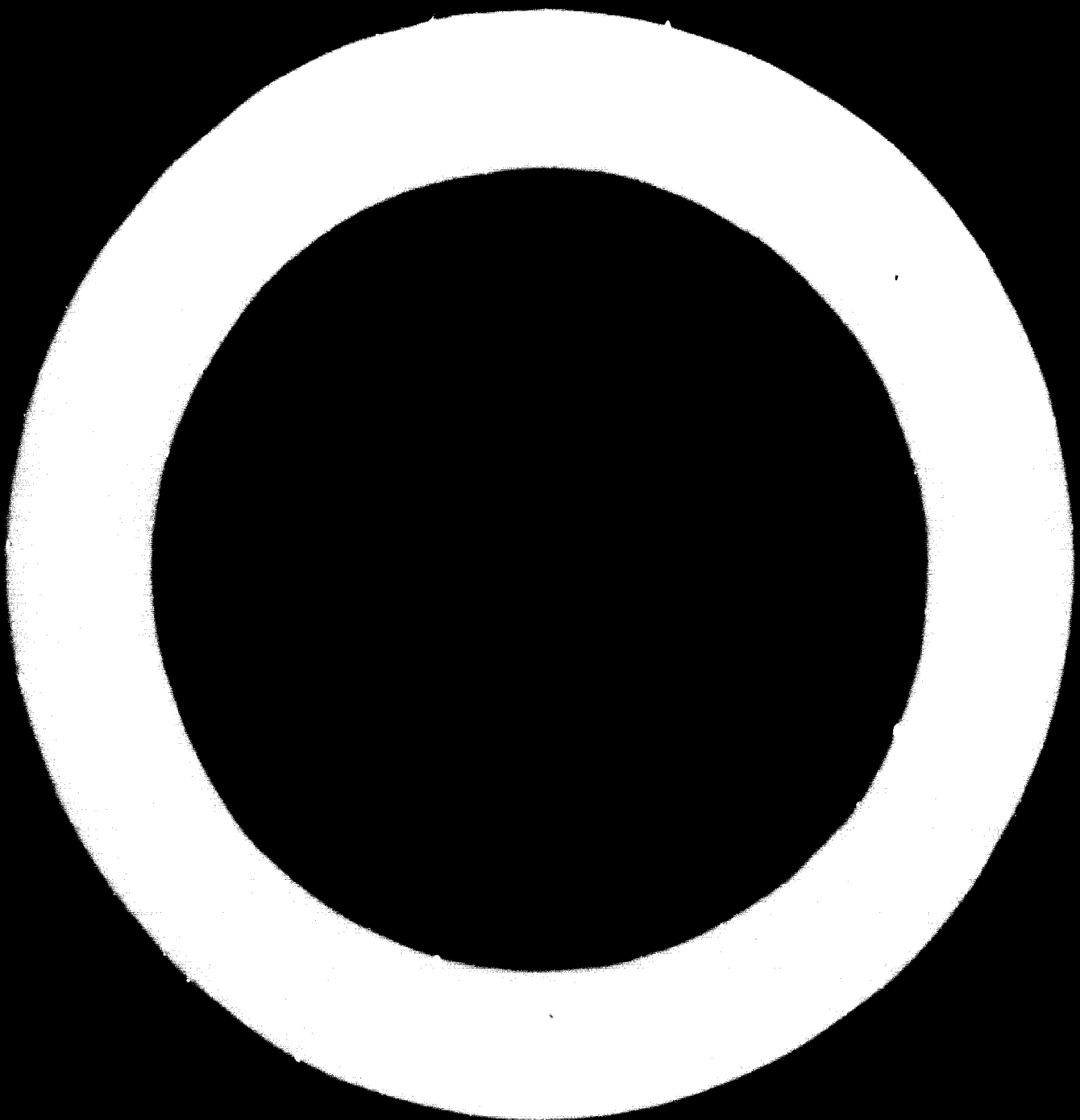
APPENDIX - Continued

Country	Name of field and discovery date	Depth (ft)	No. of wells Flowing	Pumping	Shut-in	Production in bbl Daily avg. 1st6mos. 1968	Cumulative	Gravity °API
Ecuador	Ancón, 1921	5,100	13	7	1	3,792	79,404,922	37.0
	Carolina, 1919	2,000	12	15	...	174	3,817,156	30.0
	Petrópolis, 1939	1,500	1	12	...	70	1,734,359	30.0
	Cautivo, 1918	2,600	4	184	...	611	9,572,808	31.5
	Concepción, 1931	2,500	...	1	...	518	2,730,128	36.2
	Total		30	219	1	5,165	97,259,373	
		Coastal						
Peru	Concesiones Lima, 1903	2,800-8,700	82	809	96	30,240	217,262,056	35.4-33.5
	La Brea of Parinas, 1890	2,600-8,600	128	1,016	12	15,850	483,079,683	36.2-32.9
	Sector Hualtacal, 1960	4,100-6,600	3	88	6	920	3,702,776	22.4-26.4
	Sector Patria, 1943	2,500-11,200	17	154	29	1,550	12,796,077	34.2-35.8
	Sector Peru, 1953	2,500-8,200	21	39	12	1,600	5,675,148	27.6-29.8
	Others	6,000-8,500	1	45	28	438	3,662,438	.....
		Eastern						
	Agua Caliente, 1939	1,100	...	20	5	1,400	10,783,827	43.5
	Maquia, 1959	1,800	10	3	...	1,410	4,383,231	37.2
		Offshore						
	Humboldt, 1960	5,900-7,300	8	...	...	1,865	2,137,714	33.9-37.3
	Litoral Conces, 1960	1,500-7,300	52	26	12	13,680	12,627,765	31.3-39.8
	Providencia, 1967	2,500-5,000	8	...	...	4,108	1,782,152	37.8
	Sector Litoral, 1966	1,400-7,100	5	...	...	910	695,062	37.5
	Others		2	...	...	340	160,098	35.5-38.7
	Total		337	2,200	200	74,311	758,747,927	



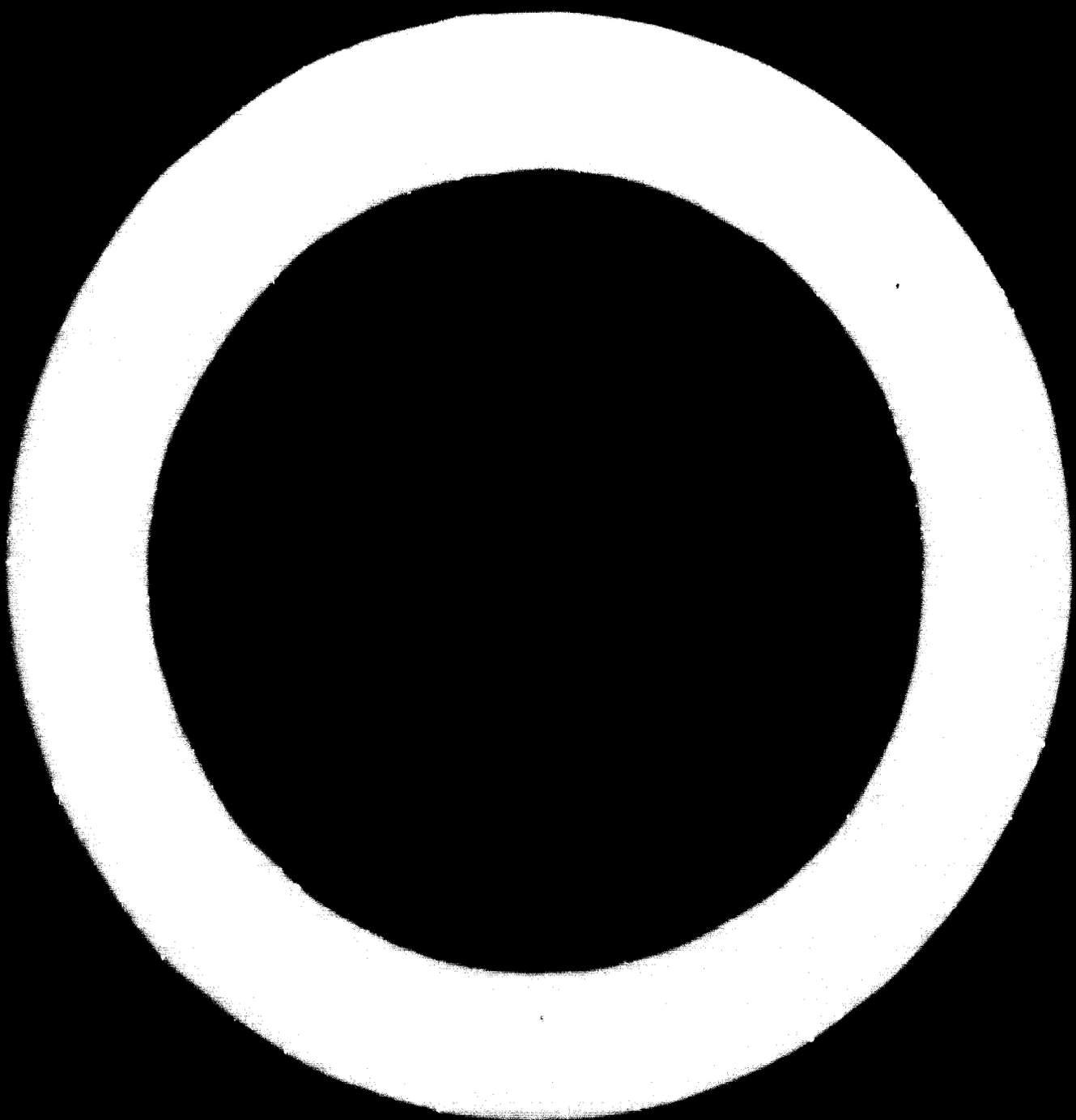
APPENDIX - Continued

Country	Name of field and discovery date	Depth (ft)	No. of wells Flowing	Pumping	Shut-in	Production in bbl Daily avg. 1st6mos. 1968	Cumulative	Gravity API
		State of Anzoátegui						
Venezuela	Araibel, 1954	8,970-10,516	10	...	22	2,131	22,397,475	38.1
	Boca, 1951	9,500	12	...	48	6,672	59,144,235	35.6
	Bucaral, 1958	9,095-10,180	3	...	1	859	2,641,049	42.1
	Caico Seco, 1946	6,500-7,300	15	1	46	5,609	33,989,664	34.1
	Chimire, 1948-1952	7,000-7,200	44	...	131	33,908	300,132,185	36.2
	Dación, 1957	6,700	7	14	25	16,229	145,568,508	19.4
	Elias, 1954	5,100-5,300	18	8	28	12,874	24,364,830	37.4
	El Roble, 1939	3,500-11,500	9	...	37	954	34,281,240	47.0
	Fria, 1947	5,736-7,300	9	6	34	4,930	25,040,725	35.3
	Guara, 1942	5,000-10,000	28	116	195	30,268	432,712,773	23.4
	Guario, 1940	5,000-10,000	4	...	56	1,062	40,289,849	45.4
	Guico, 1944	4,500-7,000	4	10	38	5,846	75,899,671	30.0
	Inca, 1948	7,100	8	...	13	3,220	5,704,144	39.0
	Junta, 1954	6,720	1	11	12	2,706	18,751,197	23.2
	La Ceiba, 1946	9,244	14	1	4	6,011	11,471,784	41.0
	La Ceibita, 1953	9,870-9,878	22	...	23	10,319	32,232,917	40.3
	Leona, 1938	2,200-12,800	15	69	96	13,355	103,825,798	22.2
	Lobo, 1952	6,400	...	8	6	868	4,032,699	15.9
	Mapiri Este, 1952	9,500	3	...	11	1,472	19,103,148	36.7
	Mata, 1954	9,000-12,500	141	24	209	68,037	322,566,342	33.9
	Merey, 1937	5,400-5,700	8	278	95	31,948	117,413,376	10.9
	Nipa, 1945	6,000-8,500	68	44	51	38,117	365,562,327	23.5
	Oficina, 1937	5,900	46	220	354	53,569	549,021,559	21.4
	Oscurote, 1952	9,513	10	16	43	13,940	86,309,617	24.4
	Pradera, 1949	6,430	2	...	8	866	7,220,489	31.9
	Quiamare, 1942	5,900	5	...	20	823	12,117,671	39.8
	Rosa, 1958	1,250-11,412	2	...	3	2,250	3,669,689	50.3
	San Joaquin, 1939	6,560	25	...	47	3,471	71,718,350	48.4
	Santa Ana, 1936	8,500	13	...	65	6,904	72,105,814	38.4
	Santa Rosa, 1941	8,500	69	...	73	41,047	223,253,199	45.6
	Soto, 1950	9,500	45	...	123	10,988	141,017,278	36.5
	Tapuco, 1953	10,100	3	...	22	2,160	20,849,077	38.9



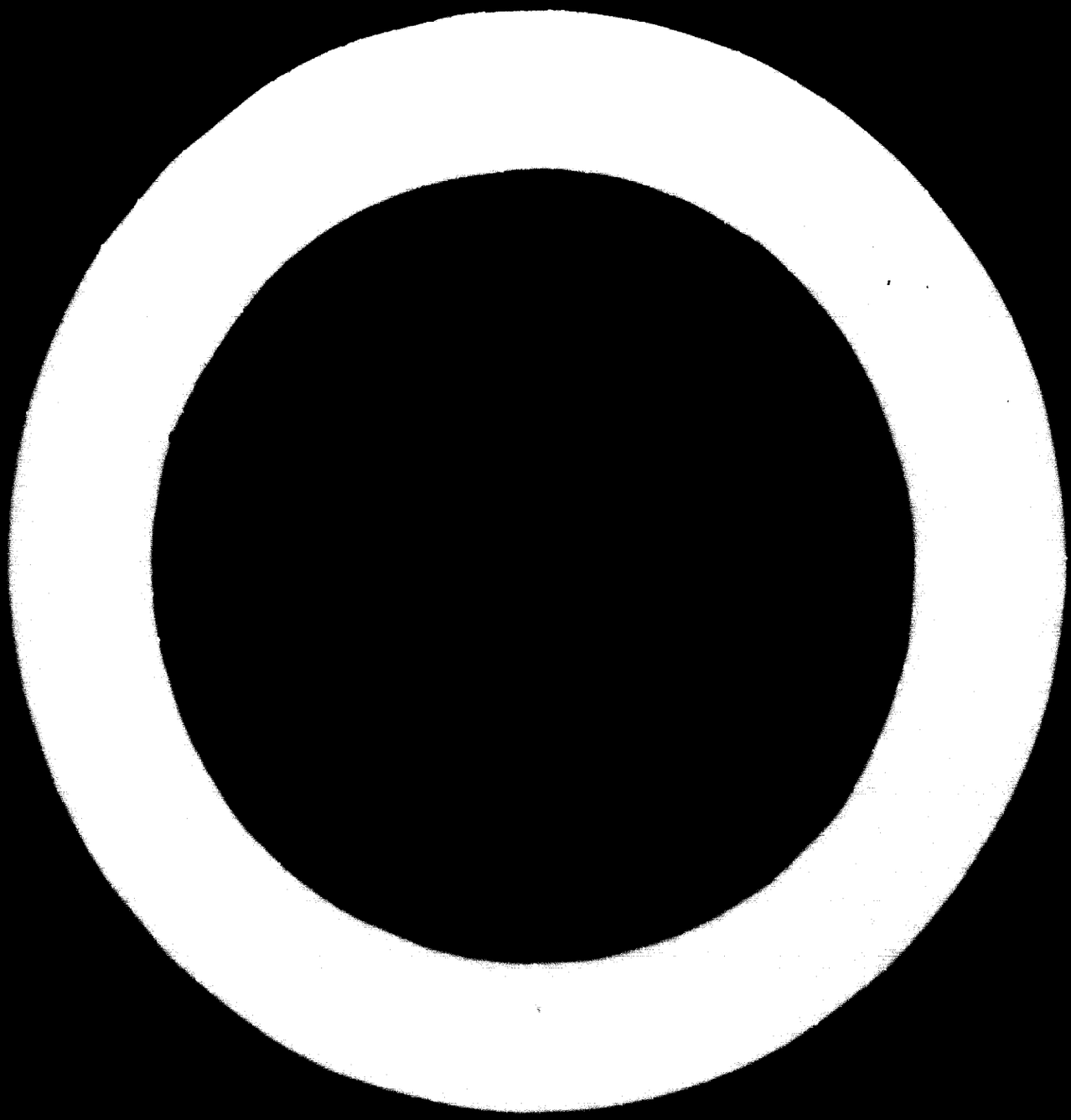
APPENDIX - Continued

Country	Name of field and discovery date	Depth (ft)	No. of wells Flowing	Pumping	Shut-in	Production in bbl Daily avg. 1st6mos. 1968	Cumulative	Gravity °API
	Yopales, 1937	4,600	19	43	60	15,671	51,752,231	24.6
	Zaguán, 1960	13,130	1	...	2	473	2,574,832	47.8
	Zanjas, 1958	13,270	7	...	9	4,566	11,941,990	33.4
	Zapatos, 1955	11,500	24	...	36	27,611	74,285,337	34.9
	Zorro, 1953	11,110	11	...	10	5,539	44,732,888	21.9
	Zulus, 1957	12,710	2	...	15	712	1[illegible],884,571	45.5
	Zumo, 1954	9,200	11	9	15	6,793	47,362,508	21.9
	Zumo Norte, 1955	9,760	1	3	5	731	8,595,924	24.5
	Others		18	4	538	5,083	96,385,788	
	Total		757	885	2,629	500,592	3,744,034,748	
		State of Barinas						
Venezuela	Hato Viejo, 1961	9,543	...	5	3	6,365	18,299,978	23.0
	Maporal, 1957	10,944	...	2	1	794	4,044,310	29.8
	Silvan, 1949	10,862	3	2	2	4,462	28,219,364	29.7
	Silvestre, 1948	8,850	2	24	12	24,358	77,752,558	26.5
	Sinco, 1953	8,500-9,100	11	31	18	43,034	142,740,639	25.6
	Others		...	2	4	747	1,313,386	
	Total		16	66	40	80,260	272,370,235	
		State of Falcón						
	Cumarebo, 1931	1,968	1	...	14	466	57,298,235	47.5
	Tiguaje, 1953	3,300	2	14	6	641	6,879,381	26.5
	Others		...	41	44	504	38,997,804	
	Total		3	55	64	1,611	103,175,420	
		State of Trujillo						
	None now producing	...	...	...	...	....	3,102,457	.....



APPENDIX - Continued

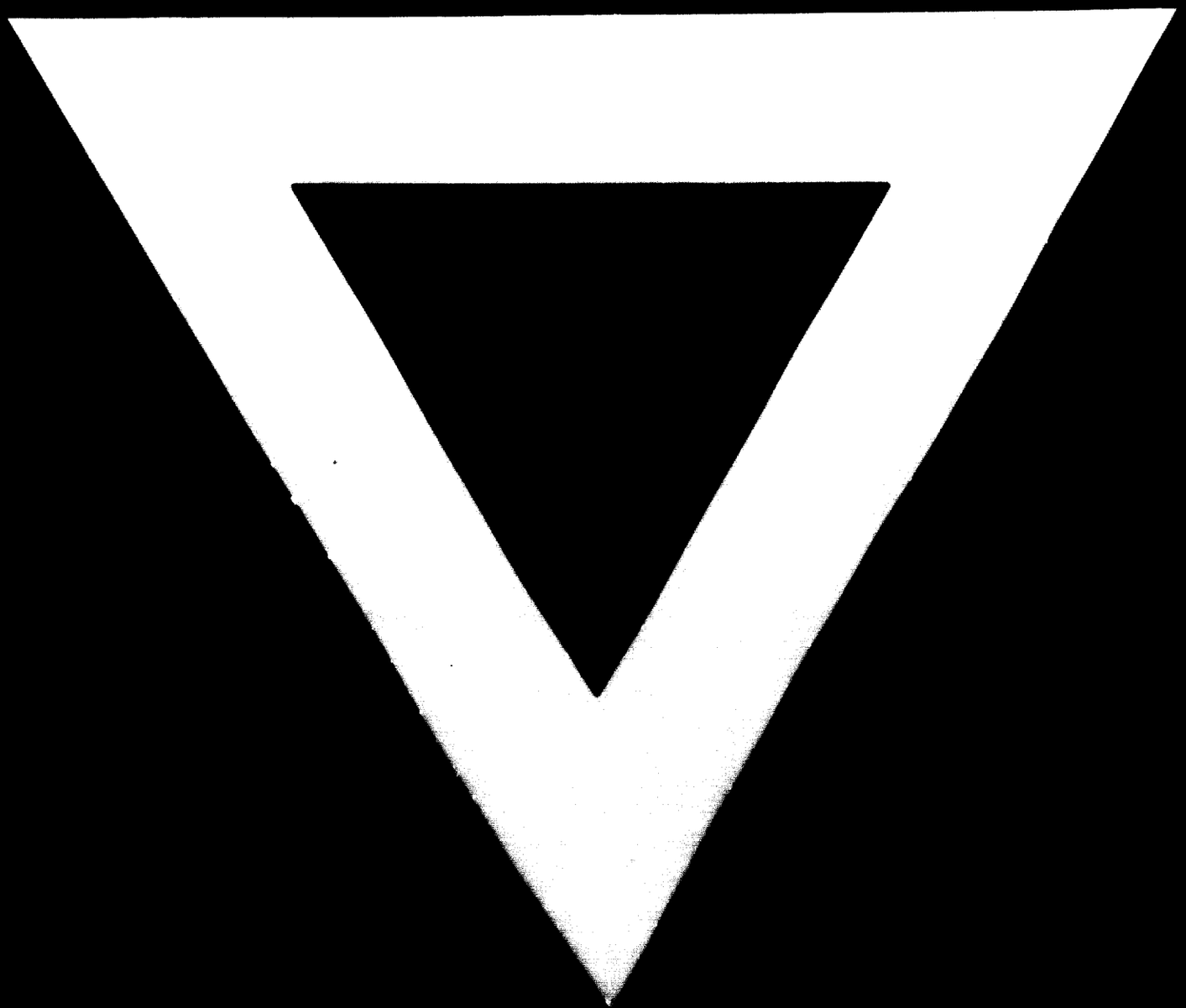
Country	Name of field and discovery date	Depth (ft)	No. of wells Flowing	Pumping	Shut-in	Production in bbl Daily avg. 1stómos. 1968	Cumulative	Gravity API
	State of Zulia							
Venezuela	Bachaquero, 1930	3,444	261	1,496	867	763,914	3,222,161,840	22.3
	Barúa, 1958	10,500	2	1	...	2,101	4,584,969	21.1
	Boscán, 1946	6,500-7,500	...	270	75	55,863	361,578,437	10.4
	Cabimas, 1917	2,200	125	412	456	83,686	1,078,146,455	23.0
	Centro, 1957	12,586	38	1	19	55,024	106,032,153	32.2
	Cruces Manueles, 1916	300-8,000	14	49	82	5,358	153,215,823	32.0
	Ceuta, 1956	9,600-11,000	23	8	34	38,742	114,377,969	29.3
	La Concepción, 1953	3,148-8,000	4	52	86	7,129	101,236,111	35.6
	Lago, 1958	11,540	7	...	13	8,878	12,529,628	32.5
	Langunillas, 1926	3,000	527	1,384	638	940,009	6,571,192,538	24.4
	Lama, 1957	8,320	188	...	71	395,952	1,077,322,152	32.5
	Lamar, 1958	13,003	55	...	26	134,964	358,816,843	35.1
	La Paz, 1925	4,268-8,000	28	29	61	32,067	729,360,560	32.5
	Los Claros, 1960	9,378	...	13	1	7,163	16,583,718	10.4
	Mara, 1945	5,248	2	20	59	12,571	350,970,991	26.4
	Mene Grande, 1914	4,132	...	326	317	15,550	551,542,498	17.9
	Rosario, 1958	12,013-12,406	1	3	2	1,536	5,103,361	33.9
	Sibucara, 1948	13,451	1	...	1	2,180	35,890,832	36.7
	Tarra West, 1947	4,250-5,500	6	9	33	2,965	56,870,315	40.0
	Tia Juana, 1928	3,000	141	1,214	326	299,214	2,124,838,564	19.9
	Others		5	58	22	259	*/3,767,527	
	Total		1,428	5,845	3,189	2,865,125	17,036,123,284	
	*/ Cifra revisada							
	Federal Territory of Amacuro							
	Tucupita, 1945	5,600	33	4	30	2,806	39,144,547	16.6
	Others		...	...	26	.....	57,415,540	
	Total		33	4	56	2,806	96,560,087	



APPENDIX - Continued

Country	Name of field and discovery date	Depth (ft)	No. of wells Flowing	Pumping	Shut-in	Production in bbl Daily avg. 1st6mos. 1968	Cumulative	Gravity °API
		State of Monagas						
Venezuela	Acema, 1960	12,520-13,750	6	...	26	7,833	5,206,885	28.6
	Aguasay, 1955	8,100-13,400	37	...	21	20,196	45,690,743	40.1
	Jobo, 1956	3,600-4,000	...	...	31	2,505	3,514,256	14.6
	Jusepin, 1938	5,300-7,000	29	...	57	2,137	187,488,893	28.9
	Morichal, 1958	3,312	...	121	31	27,090	64,240,243	11.8
	Oritupano, 1950	7,657	12	55	23	14,302	67,429,027	19.3
	Orocual, 1933	2,954	8	1	21	998	10,014,777	19.9
	Pilón, 1937	3,350-3,600	...	1	46	14,106	32,550,407	14.6
	Pirital, 1958	450-1,100	...	37	7	4,051	10,594,797	17.0
	Quiriquire, 1928	7,000-7,200	1	441	22	32,347	675,379,068	16.5
	Santa Bárbara, 1941	5,000-6,500	29	19	239	7,476	145,923,800	21.7
	Tacat, 1953	1,830-3,668	...	81	52	6,300	28,171,624	16.9
	Tomblador, 1936	3,500-4,500	6	...	38	7,078	85,398,728	21.9
	Others		3	3	267	8,726	144,857,673	
	Total		131	759	881	155,145	1,506,460,921	
		State of Guárico						
	Ipire, 1958	3,000-5,000	5	2	1	968	1,990,439	36.8
	Las Mercedes, 1942	1,200-4,500	16	26	170	4,312	122,164,961	30.9
	Ruiz, 1949	4,450	3	3	8	1,385	28,753,683	30.6
	Sabán, 1947	2,600	...	17	46	665	17,404,594	38.2
	Tamán, 1949	5,200	...	8	...	543	12,651,247	38.9
	Tucupido, 1947	2,800-5,600	3	8	14	533	16,962,031	39.8
	Budare, 1959	4,523	3	...	2	2,221	409,177	30.4
	Others		11	1	10	545	13,543,411	
	Total		41	65	251	11,172	213,889,543	
	Total Venezuela		2,409	7,679	7,110	3,616,711	22,975,716,685	

Source: Oil & Gas Journal



24. I. 72