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Mexican petroleum since nationalization.

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Thesis

MEXICAN PETROLEUM SINCE NATIONALIZATION

by

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Approved by

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Professor of Economics
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INTRODUCTION

The nationalization of the petroleum industry in Mexico in 1938 was an event which attracted world-wide attention. In particular it was a matter of deep concern in the United States, Britain and Mexico and as a result a vast body of literature appeared, much of it tendentious, dealing with the legal, diplomatic, historic, sociological and economic aspects of the expropriation of the foreign-owned petroleum companies.

More than a dozen years have passed since Mexico nationalized her petroleum industry. During this period Mexico struggled with internal and external problems of great magnitude in its effort to assimilate the newly acquired petroleum industry into the national economy and to manage the production and distribution of petroleum efficiently.

Enough time has elapsed since the expropriation to warrant a study which would examine the process of assimilation and its results. No full scale study of this kind has thus far been made to the knowledge of the writer. Hence, the present thesis attempts to fill this gap within the limits set by a master's dissertation and the availability of materials at Boston University and other library sources in the greater Boston area.
The study is partly chronological and partly topical. The first three chapters are primarily chronological. They relate the main events leading to expropriation, the domestic and international repercussions immediately following this event, the organization of Pemex, the official Mexican government petroleum agency, the impact of World War II on its operations and the technological, political and labor relations problems of this agency until its reorganization and stabilization in 1947.

The topical treatment covers the problems and development of: 1) petroleum production, including refining; 2) petroleum consumption and its relationship to industrial development, production of natural gas, and the exporting and importing of petroleum products; 3) equipment and technological development, including transportation facilities; 4) the return of foreign capital and the new conditions imposed on private investment in petroleum; and 5) petroleum fields, reserves and explorations.

A great variety of sources were consulted for general orientation and specific data. In addition to the standard works, both Mexican and American, dealing with the expropriation itself, general studies concerning industrial development in Mexico and a large body of periodical literature, both Mexican and American, were consulted. Of particular importance have been the American trade journals
which have furnished invaluable data.

The thesis has been conceived primarily as a descriptive study. No attempt has been made to enter into the controversy with respect to the justification or lack of it, for the expropriation of the foreign oil companies. Only in the concluding chapter is an attempt made to estimate the effectiveness of the petroleum operations under Mexican government management.

In the preparation of this thesis the author is greatly indebted to Professor Maurice Halperin, chairman of the Department of Latin American Regional Studies at Boston University, for his guidance, in the preparation of the thesis and constructive criticism of the manuscript as each chapter was written. Grateful acknowledgement is made to Professor Everett J. Burtt of Boston University for his valuable advice on many of the economic problems dealt with.

The author wishes to thank Mr. Gordon Duke, representative of Southeastern de Mexico, for his kindness in forwarding vital information concerning the return of foreign capital for the development of the Mexican petroleum industry.

I am especially pleased to acknowledge my indebtedness to my wife Ann Gramolini for her patient understanding and encouragement, and to my daughter Stephanie for relinquishing many hours of playful companionship with her father so that the writing of the thesis could be accomplished.
Finally, I owe special thanks to the United States Government for providing the means, through Public Law 346, which have made it possible for me to pursue graduate study and to prepare this dissertation as part of my graduate program.
CHAPTER I

MEXICAN PETROLEUM BEFORE NATIONALIZATION

Petroleum was apparently known to the aboriginal inhabitants of Mexico long before the Spanish conquest. Hubert Herring in his work *Mexico The Making of a Modern Nation*, gives a good description of the early use of petroleum:

Fray Bernardino de Sahagun, sixteenth century missionary, reported that the Aztecs skimmed petroleum from shallow ocean inlets, and offered it as a sacrifice to the gods, as medicine to the sick. The Aztecs called it Chapuputli. To this day Mexican chauffeurs call lubricating oil Chappote. The Franciscan friar translated the word *pasta perfumeada humeante*. Neither Aztecs nor Sahagun could know what mingled joy and sorrow this 'smoking perfumed paste' would bring dwellers in the land of Moctezuma.

The first commercial exploitation of petroleum in Mexico was attempted by American and English companies around 1864 and a later one in 1880 but both were unsuccessful. Another attempt was made by the Mexican Oil Corporation and the London Oil Trust, both English firms, but they failed after a loss of some 160,000 pounds sterling.

Rise of the Petroleum Industry

The first successful wells were developed from 1901 to 1910 when American and English capital returned after first attempts had failed. Edward L. Doheny and his associates formed the Mexican Petroleum Company of California and made sporadic progress at first. Their first success was at Cerro de la Pez and their yield for nine years was approximately...
3,500,000 barrels. Later short-lived wells were brought in.
The first major oil field was discovered in 1910 by the Aguila
Company (Cawdroy), an English firm. This firm brought in the
famous Portrero del Llano number four well which produced
100,000 barrels of crude petroleum daily. Over 100,000,000
barrels were obtained from this well up to December, 1918
when salt water filtered in to ruin it. The discovery of
this well encouraged exploration activities in this section
of Mexico and this area became known as the Golden Lane
fields.  

Progress in Mexican exploitation at first was slow
because of the great financial risks involved. Almost all
the money invested was by foreign companies. From 1912 on,
petroleum production increased at a tremendous rate with more
than twenty-five American companies moving into Mexico.
Mexican petroleum production was greatly stimulated by other
industrial developments. Locomotives, ships and factories
were beginning to convert to oil. For example, in the period
from 1922 to 1935 coal consumption on ships throughout the
world declined approximately 25 per cent while that of pe-
troleum increased approximately 90 per cent.  

Despite these new demands for petroleum Mexico would
not have reached such high production figures as she did had
it not been for the first World War. The war brought Mexico
close to the top of the petroleum producing nations.
Mexican production reached its peak in 1921 when she produced 550,000 barrels daily.

The high rate of production of the Mexican fields was bound to fall. The terrific pace set by the new demands could not be maintained unless new fields were opened. The lack of foresight or reluctance to use more capital by the oil companies resulted in an unfavorable situation. The high flush production, the early invasion of salt water, government taxes and government restrictions all led to a reduction of 50 per cent in production by 1926. The political aspects of this reduction in production will be discussed later.

Role of the United States in Mexico’s Great Oil Period

American interests played a big part in the tremendous rise of production and the subsequent fall. The following table shows clearly the large role played by American capital.

<table>
<thead>
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<th>Year</th>
<th>Production</th>
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<tr>
<td>1912</td>
<td>45,200</td>
<td>25,900</td>
<td>57.3</td>
</tr>
<tr>
<td>1913</td>
<td>70,400</td>
<td>40,300</td>
<td>57.2</td>
</tr>
<tr>
<td>1914</td>
<td>71,900</td>
<td>41,200</td>
<td>57.3</td>
</tr>
<tr>
<td>1915</td>
<td>90,200</td>
<td>51,600</td>
<td>57.2</td>
</tr>
<tr>
<td>1916</td>
<td>102,300</td>
<td>58,600</td>
<td>57.3</td>
</tr>
<tr>
<td>1917</td>
<td>151,900</td>
<td>99,500</td>
<td>65.6</td>
</tr>
<tr>
<td>1918</td>
<td>175,900</td>
<td>124,800</td>
<td>70.9</td>
</tr>
<tr>
<td>1919</td>
<td>253,300</td>
<td>187,900</td>
<td>74.2</td>
</tr>
<tr>
<td>1920</td>
<td>445,500</td>
<td>320,800</td>
<td>72.0</td>
</tr>
<tr>
<td>1921</td>
<td>549,500</td>
<td>401,900</td>
<td>73.1</td>
</tr>
<tr>
<td>1922</td>
<td>508,500</td>
<td>404,200</td>
<td>79.5</td>
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By 1934, of the total investment in Mexican petroleum 52 per cent was American, 46 per cent English and Dutch although in 1938 when the expropriation occurred the relative positions had changed with British and Dutch investments calculated at more than 50 per cent of the total foreign petroleum investment.

**Díaz and the Petroleum Companies**

How did these foreign companies become established in Mexico? Most of the foreign concerns entered Mexico during the regime of President Porfirio Díaz. He gave generous concessions not only in petroleum but in other fields as well. During Díaz's regime two men dominated Mexican petroleum production. Sir Weetman Pearson, an Englishman, encouraged by Díaz, produced 58 per cent of the national petroleum output by 1910. The other man, Edward L. Dohney, obtained enough concessions to be able to produce 42 per cent of the national output by 1910. These two men laid the foundation of the oil industry of Mexico which finally fell into the hands of the Standard Oil Group and the Dutch Shell interests. These oil concessions were granted on very liberal terms. The concessions in turn provided Díaz with additional revenue in the form of royalties, thus helping him to stay in power. The oil companies paid the prevailing low wages of the time. Thus, the arrangement between the government of Díaz and the oil concerns was mutually
satisfactory.

The few existing laws or codes concerning petroleum were in favor of this influx of foreign capital. Up to the fall of the Díaz regime there were the four following codes or laws concerning petroleum:

2. The Mining Code of November 22, 1884 gave owners of the land exclusive ownership of all petroleum deposits with the rights to develop them.
3. The Mineral Law of June 4, 1892 also gave the land owner the right to exploit the subsoil.
4. The Mineral Law of November 25, 1909 stated that surface rights carried with them subsoil rights.6

The regime of Porfirio Díaz thus had ample legal grounds to permit petroleum development by private capital, domestic or foreign. Since domestic capital was insufficient and lacked the necessary enterprise, foreign capital had the field to itself. However during the years from 1900 to 1910, other developments, particularly the pressure from the landless masses, was to result in the Mexican Revolution of 1910 and bring great changes affecting the status of the oil companies.
The Revolution

After the overthrow of Porfirio Díaz in 1910, there was a conflict between three forces: 1) the Indian or mestizo masses who were clamoring for land; 2) the small Creole aristocracy which had prospered under Díaz; and finally, 3) a rising middle class which supplied the revolutionary leadership. The middle class resented the draining of the national wealth by foreigners. It raised the slogan of "Mexico for the Mexicans". Each of these forces fought for its interests and in the process Mexico was torn with strife, with the masses bearing the brunt of the turmoil. The ten years after Díaz's overthrow, from 1910 to 1920, was the violent phase of the revolution. It was a period of destruction and slaughter, but out of it there emerged a profound change. The Díaz oligarchy and the landed aristocracy were largely eliminated. Land was returned to the peasants. The middle class was now the important element in the new Mexican government.

Despite the change of government in Mexico, foreign interests still had a strong position in the Mexican economy. One of their main holdings was in the petroleum industry. Foreign companies were thus a constant reminder of the past. They recalled the Díaz regime and all it stood for. Any political aspirant always attacked the foreign companies and he was sure to win public applause. The foreign companies
apparently failed to appreciate the strength of this latent hatred on the part of the Mexican people who, irrespective of the facts, blamed all of Mexico's troubles on them. The Mexicans felt the foreign concerns had played politics and had a contempt for Mexican institutions. Whether or not the Mexicans were justified in this attitude is not our concern in this paper. What is of importance is the fact that this is the way they felt.

Post-Revolutionary Period

President Venustiano Carranza, the first revolutionary leader to provide a relatively stable government, gave Mexico a constitution on February 5, 1917. Under Article 27 of this constitution, Mexico laid the legal groundwork by virtue of which the foreigners would be expelled twenty-one years later. The sections of Article 27 that concern us are as follows:

The Nation has direct ownership of all minerals or substances which either in veins, lodes, masses, or beds, constitute deposits the nature of which may be distinct from the components of the earth, such as ores from which are extracted metals and metalloids used in industry; beds of precious stones, rock salt, and the salt pans formed directly by seawater; all products derived from the decomposition of rocks when their exploitation necessitates underground labor; all material or organic deposits of materials susceptible of being used as fertilizers; all solid mineral combustibles; petroleum and all solid liquid, or gaseous hydrocarbons.

... the authority of the Nation is inalienable and imprescriptible, and concessions may be made only by
the federal Government to private individuals or civil or commercial companies constituted in accordance with Mexican laws, with the condition that they establish regular work for the exploitation of the materials involved, and comply with the requirements of the law. With regard to petroleum and solid, liquid, or gaseous hydrocarbons, no concessions may be granted, and the respective regulatory law will determine the form in which the Nation may carry into effect the exploitation of these products.

The capacity to acquire ownership of lands and waters of the Nation shall be subject to the following regulations:

1st. Only Mexicans by birth or by naturalization or Mexican companies have the right to acquire ownership of lands, waters, and their appurtenances or to obtain concessions for the exploitation of mines, waters, or combustible minerals in the Mexican Republic. The State may concede the same right to aliens provided they agree before the Ministry of Foreign Relations to consider themselves as nationals with respect to said properties and not to invoke the protection of their Governments in reference to same; should they fail to respect the agreement, they shall be penalized by losing to the benefit of the Nation the properties they may have acquired.

The post-revolutionary Mexican government, once it had consolidated itself, denounced the outright grants of the Díaz regime as illegal. The government felt that Porfirio Díaz did not have the right to give away Mexico's natural resources. The Mining Laws of 1884, 1892 and 1909 were acts of a dictator and therefore the Mexican Republic was not responsible for them.

The oil companies sat uneasy during Mexico's revolutionary period. The first indication of impending trouble took place during the regime of President Plutarco Elías Calles. Hubert Herring describes the action taken by President Calles
in the following passage:

President Calles on December 31, 1924, signed a new petroleum law, implementing the 1917 Constitution. This law provided for definite national control of the oil industry. It reaffirmed the State's ownership of subsoil wealth, and authorized exploitation by private interests under definite limited concessions from the State.9

When asked if he had fully understood the consequences of his stand President Calles replied, "I have already stated that the government over which I preside has meditated the consequences of its conduct and that it is ready to fall but never to compromise with the forces historically hostile to our Fatherland."10

This new petroleum law under President Calles was the signal for a struggle that was to last until the final expropriation decree under President Lázaro Cárdenas in 1938. Before going into the regime of President Cárdenas and the final expulsion of the foreign oil companies it would be helpful to consider the reactions of Mexican labor and the foreign oil concerns.

World Troubles Affect Mexico

Vital to an understanding of Mexican labor and Mexican petroleum are two events that occurred twenty years before the expropriation decree of 1938. No doubt Mexico would have taken a different course had it not been for World War I and the Russian Revolution. These two events not only plunged
the world into conflict but also had serious repercussions in Mexico. Here we have a case of outside pressure bringing a serious problem to a head in a country not involved in the global issue.

The war changed Mexico's petroleum picture completely and she came to the fore as a great producer. Mexicans were awaking to the great economic force that lay under their feet. The Russian Revolution had an even more profound effect on Mexico. Mexican labor had been a radical political force and further impetus was given to it by the force of Communism. Labor in the petroleum industry had special importance because petroleum held a vital place in the national economy and therefore in Mexican politics.

**Labor and the Foreign Oil Companies**

Mexico had two major trade union federations. One was the C.R.O.M. (Confederación Regional Obrera Mexicana) which was the older group, conservative and similar to the A.F.of L. in the United States. The other federation was radical. The C.T.M. (Confederación de Trabajadores de México) can be correlated to the C.I.O. The two most important industries, the railroads and petroleum, were controlled by the C.T.M. which later was synonymous with the Lázaro Cárdenas government.

Under the Constitution of 1917 Mexican labor groups had more legal rights than any labor group in the world. The Constitution and subsequent legislation called for labor and social
benefits, an eight hour day, minimum wage law, right to organize, the right to strike with police protection for the strikers. Provisions for housing for the workers and social insurance were also included.

Mexican labor complained that working conditions in foreign-owned industry needed drastic change. No protection for the workers had existed until the Federal Labor Law was passed. The workers of the oil industry declared that,

... at times actively and others passively, the oil companies were evading enforcement of the Labor Law. In view of the nature of the work and of the physical conditions under which it was performed, wages were unjust; the companies failed to furnish their workers with adequate housing; in the oil fields, the most elementary requirements of sanitation were lacking, in brief, the treatment the workers received from their employers was not that of human beings.\textsuperscript{12}

Mexican labor pointed out the vast difference in the wage scales of the Mexican oil workers compared to those of the American oil workers in the United States. As a general rule, the Mexican worker was paid an average of one-third the American wage rate. This difference in the wage scale was unjustified, claimed Mexican labor:

Because of the greater wealth of the Mexican subsoil the average production per worker employed in the industry is much higher in Mexico than in the United States. It would be logical to suppose that this circumstance should be reflected in higher wages for Mexicans than for American workers.\textsuperscript{13}

Mexican labor went on to point out that the average production per Mexican worker in 1934 was 2350 barrels per
day, while in the United States it was 750 barrels per worker.

The foreign oil companies, on the other hand, told a different story. The companies felt that the charges by Mexico were unjustified. They felt that American know-how and technology had benefited Mexico. The wages of the petroleum workers were the highest of any Mexican industry. William E. McMahon in his work *Two Strikes and Out* points out that:

Always the oil business had not only paid its help, from top to bottom, better than any other industry in Mexico, but almost fantastically higher than the average. Mexican government statistics, most certainly not rigged in favor of the oil companies, alone prove that. In the report for 1936, the contrast stood as follows:

<table>
<thead>
<tr>
<th>Industry</th>
<th>Daily</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum</td>
<td>7.42</td>
<td>2,671.20</td>
</tr>
<tr>
<td>Light and Power</td>
<td>5.09</td>
<td>1,632.00</td>
</tr>
<tr>
<td>Street Railways</td>
<td>4.55</td>
<td>1,555.20</td>
</tr>
<tr>
<td>Mining</td>
<td>4.32</td>
<td>1,348.00</td>
</tr>
<tr>
<td>Textiles</td>
<td>3.15</td>
<td>1,126.80</td>
</tr>
</tbody>
</table>

Further, almost alone among Mexican industries they furnished free housing, free medical care, with hospitalization when necessary, for the workers and their wives and children; scholarships, good schools, playgrounds and sport equipment, company accountants calculated that these social benefits increased the basic wage by about ninety per cent. 14

The companies claimed since

... of $3.00 received from Mexican oil, $2.00 stayed in Mexico, the talk of exploitation of a helpless nation by foreign capital can be valued at its real worth. Of the remaining $1.00 the companies had to pay expenses in the United States as well as the price for purchases of material in the United States. 15
The foreign concerns felt they were helping Mexico. They supplied the technology and Mexico benefited by taxes, roads, a better supply for her growing domestic consumption and a big stimulus for her newly developing industry.

The First Sign of Trouble

As has already been stated the first sign of trouble in the relations between Mexico and the foreign companies arose with the passage of the new petroleum law of President Calles. The diplomatic wires between Washington and Mexico were hot and early in 1927 war was not a remote possibility. The United States ambassador to Mexico, Dwight W. Morrow, and President Calles met and an agreement was reached. The issue went before the Supreme Court of Mexico and Mexico recognized oil rights before 1917.

This did not settle the issue, however, and conditions from 1928 to 1935 were trying. The Mexican government, quick to respond to public opinion, in 1934 organized an oil agency. The aim of this agency was to bring the Mexican government into the oil business through a public corporation and to provide a nucleus for a government oil administration if nationalization of the petroleum became necessary.

Expropriation Under President Cardenas

The beginning of the final crisis occurred in November 1936 under the Cardenas government. The oil workers presented demands for wage increases and greater social benefits to the
foreign companies. They were backed by the Cardenas government. Negotiations were started and it was not until May of 1937 that the foreign companies agreed to add some 13,000,000 pesos to the workers salaries. The petroleum union held the agreement up on the grounds that the amount given was far less than the salaries received by United States petroleum workers. On May 27, 1937 the workers went on strike. The issue was taken before a board of arbitration.

The demands of the union were a forty hour work week, a pension system, eighteen compulsory rest days a year, vacations of from twenty-five to sixty days a year depending on the length of service, a saving fund, scholarships for the workers, an indemnity for workers laid off, medical services, payment for deaths and accidents on and off the job, housing for the workers, etc. The increase the union demanded would amount to 114,611,460 pesos a year.16

The companies held that these demands were unreasonable. Their annual profits were not 16 per cent as the petroleum union claimed but 7 per cent. The companies said that for many years they had provided free medical and hospital facilities for their employees. The union demands would mean the companies would not only have to take care of the worker but also his family including his grandparents, great grandparents, etc. The companies held that with vacations, legal holidays, feast days, etc., demanded by the
workers, it would only leave 223 work days out of the year, yet the companies would have to pay for the full year. The companies considered all possible concessions and presented them to the workers.\(^{17}\)

When the findings came from the arbitration commission a majority of the union claims were accepted. The companies refused to accept the decision. The added costs officially came to 26,000,000 pesos annually. The companies said that the total costs would come to 41,000,000 pesos and they only earned 13,000,000 pesos. The companies filed an injunction in the Mexican Supreme Court on December 28, 1937. This petition was refused. At the last minute President Cardenas tried to get an agreement. The issue now boiled down to haggling over how much the companies would pay. President Cardenas promised the costs would not be above 26,300,000 pesos annually. The companies were willing to settle for 22,500,000 pesos annually. The next offer by the companies went to 26,000,000 pesos but on the condition that the administrative controls be kept in their hands. No agreement was reached and on March 18, 1938, President Cardenas issued his expropriation decree.\(^{18}\) The decree provided for compensation, under Mexican law, though no amount was indicated at that time.

**International Repercussions**

The die was cast, Mexico stood on trial before the
world. This act of Mexico changed the petroleum picture completely. Foreign oil companies began to worry about other areas under their control. Tensions over the expropriation increased and with war clouds over the Atlantic and Pacific the situation was dangerous. The United States had embarked on her Good Neighbor Policy and she also stood on trial before the other Latin American countries. President F. D. Roosevelt showed the good intentions of the United States when he refused to attempt to force Mexico to protect the property of the American companies. The United States did not deny that Mexico had a legal right to expropriate but it did object to expropriation which did not adequately compensate the owners. Relations between the United States and Mexico were not as strained as between Mexico and England. England severed diplomatic relations with Mexico. Some writers claim that had it not been for the approaching war in Europe and the Monroe Doctrine, enforced by the Good Neighbor Policy, England may have attempted to use force in Mexico. At any rate, all efforts to reach a settlement on a just compensation failed.

Public Opinion in Mexico

When the foreign oil companies were driven out, Mexico went on a patriotic spree. During the time the case was being negotiated, public opinion in Mexico was at a high pitch. The government had pushed the issue so far that the
public would have resented any settlement. The popular mood of the Mexicans can be seen in the following passage by Hubert Herring. "One Mexican said to another: 'I hear the British are sending a fleet to Tampico.' 'They don't dare,' was the reply, 'they know President Cardenas will expropriate it.'"\(^{19}\)

A new nationalism was born in Mexico with the expropriation. Probably for the first time in her history Mexico was united on one issue. The issue was no longer over petroleum but Mexico's desire to face the future by herself. The public rallied behind the government, donations kept pouring in, women gave their wedding bands for the cause and children in the schools contributed their pennies. To round out public feeling the Roman Catholic Church, which had been practically at war with the government, created a sensation by calling for the people to back the government in this serious crisis. The general attitude of Mexicans was that it would be better to let the oil stay in the ground rather than to allow the oil profits to go to foreigners.
CHAPTER II

THE TRANSITION FROM PRIVATE TO PUBLIC OWNERSHIP

Mexico's petroleum problems did not end with nationalization; on the contrary they just began. In March 1938, when the Mexican government expropriated the properties of the foreign oil companies, all property and operations, including producing, refining, and distribution, were taken over by the government corporation "Pemex" (Petróleos Mexicanos). The industry was placed in the hands of an Administrative Council of Petroleum composed of nine members - six government representatives and three representatives of the syndicate of petroleum workers.20 This agency in itself was a major problem in the transition from private to public ownership. How Pemex operated will be treated in the next chapter. Suffice it to say here that the government was now the employer, with all the headaches involved in dealing with labor, production, distribution, technology, equipment, etc.

The other main problems faced by the Mexican Government, may be summarized as follows: a) boycott of Mexican petroleum by the foreign oil companies; b) repercussions on the national economy of the boycott; c) increased domestic demand for petroleum; d) transportation difficulties; and e) international political problems.
Mexican presidents before Lazaro Cardenas did not feel the time was appropriate to expel the foreign oil companies. Most of them realized that Mexican nationals were inexperienced in oil know-how, and would be unable to run the oil fields efficiently. Other presidents feared the international repercussions of such an act. One thing they all knew would happen, and that was certain retaliation by the oil companies.

The pre-expropriation economy of Mexico was based primarily on two extractive industries, mining and petroleum. Before Cardenas, Mexican presidents did not feel that the government and economy were strong enough to rely on the revenue of mining alone. President Cardenas however, felt that then, in 1938, if ever, was the time to expel the foreign companies. Many Mexican nationals working under the tutelage of the foreign concerns had become experts in various branches of oil production so that the transition from private to public ownership, it was believed, would not be so difficult. The Mexican people were solidly behind the government. In the international scene, President Cardenas felt that the possibilities of war in Europe and Asia would divert foreign pressure from Mexico and she would be allowed to solve her own difficulties. President Cardenas was convinced the government and economy were now secure enough to meet any emergency.
Boycott and Crisis

Just how much the Mexican economy would be affected by the expulsion of the foreign oil companies became apparent as soon as they left. The expropriated oil companies refused to buy Mexican oil. The oil companies withdrew their tankers. Without tankers Mexico could not transport her petroleum to new markets. Mexico had plenty of oil but no one to buy it. The once busy oil ports suffered a temporary decline in activity as exports of crude petroleum dropped from 24,560,000 barrels in 1937 to 8,564,000 barrels in 1938. Mexico no longer received the huge amounts of royalties from petroleum to balance her foreign exchange. Mexico found herself unable to get essential machinery and equipment for her industries. Her credit structure was shaken.

Economic Repercussions

All phases of the Mexican economy were shaken as a result of petroleum nationalization. The tourist trade had been increasing every year and was beginning to be a big business. The petroleum problem discouraged many American and European tourists from visiting Mexico. In 1938 the number of tourists dropped to a third of what it had been in 1937.21

Trouble also came to domestic business and industry. They were dependent on foreign concerns for goods. Many foreign concerns, in sympathy with the oil companies, refused
to send goods and equipment. To complete the picture of a badly strained economy, the value of the peso dropped from twenty-eight cents to less than sixteen cents. With no other export to take the place of petroleum, the balance between exports and imports was broken. The gold and silver reserves reached a low point. In a desperate position, the Mexican government issued additional paper money. Mexico started on the road to inflation.

**Increase in Domestic Consumption**

Further problems arose because of the increase in domestic consumption of petroleum products. Even before nationalization Mexico had been importing refined petroleum because of her lack of refineries. Petroleum was shipped out crude to the United States and returned refined. This exchange was stopped with nationalization and Mexico was left without a sufficient amount of high test gasoline, tetroethyl and other refined products to meet her domestic needs. The new government petroleum agency faced a serious problem in keeping up with domestic needs.

Mexico consumed more refined gasoline than she produced. This outstripping of production was due to many factors such as the development of industry, the rapid motorization of Mexican transportation and the increased use of petroleum products as fuel in homes and apartments. The Mexican petroleum agency not only had to keep pace with normal
production but an increasing one.

**Transportation Difficulties**

It was a difficult job to get the petroleum to the domestic market. The foreign oil companies had built pipelines from the producing fields to the sea. The whole pipeline network was geared for exports. However, the main region of domestic consumption was in the central highlands of Mexico. Thus the government oil agency would have to start from the beginning to build expensive pipe lines over rugged terrain. The only way Pemex could get capital for such an expensive undertaking was to export petroleum, but with the lack of tankers and the boycott by foreign countries very little could be exported. New railroad tankers and tank trucks were almost impossible to get even if money was available for them.

The following quotation from the *Mexican American Review* shows that in 1943, five years after nationalization, the petroleum transportation problem was still serious:

Oil trains were given the right of way over passenger trains recently in an effort to relieve a serious shortage of gasoline and fuel in the North Central areas of the Republic. The government railway administration ordered the suspension of passenger traffic, if necessary, to move the oil trains in from the coast.²²

**International Problems**

In international relations Mexico faced great problems. The United States, the Netherlands and Britain were the chief
countries that did business with Mexico. Once Mexico nationalized her petroleum industry these three countries, pushed by the oil companies, put political and economic pressure on the Mexican government.

The British and Dutch had suffered somewhat larger losses than the Americans in the expropriation decree of 1938. British and Dutch oil companies put a strict embargo on Mexican oil. Both countries had to limit their protests of the seizure of their properties to political and economic pressures because of the serious crisis in Europe. In 1939 Britain and Mexico severed diplomatic relations. Tension between Mexico, Britain and the Netherlands did not subside until the end of World War II. The embargo of Mexican oil by the Dutch and British remained in effect until September 15, 1947.

One of the results of this pressure by the United States, Britain and the Netherlands was to drive Mexico to do business with Germany and Japan. The Mexicans were forced to sell to anyone. An agreement was made by which Germany took Mexican petroleum in exchange for blocked marks and German goods. Some of these goods replaced American products. An attempt was also made to sell petroleum to the Japanese. This plan failed to materialize because the export facilities were on the east coast. With the expense of going through the Panama Canal, and the distance from
Japan, the cost of petroleum would be too high for the Japanese oil concerns to make a profit.

The arrangement between Mexico and Germany caused much concern in United States government circles. Conditions in Europe were critical and the agreement between Mexico and Germany caused uneasiness in the United States.

The big stumbling block to any attempts at reconciliation between Mexico and the United States was how much the American oil companies were to be paid for the confiscation of their property. Four months after Pearl Harbor, on April 1942, a settlement was reached with most of the American oil companies. The United States wanted the petroleum controversy out of the way in the interests of wartime hemispheric solidarity. An agreement was finally reached and the United States oil companies received 23,995,991 dollars for their properties (see Table II. Losses from Expropriation in Mexico).

The United States oil companies felt their own country had sacrificed them to get better relations with Mexico. The biggest bone of contention of the oil companies was that the 23,995,991 dollars they received for their properties was far from being a just compensation because of the tremendous reserves that lay under their lands when they were forced out of Mexico. The attitude of the oil companies can be summed up as follows: "Said one disgruntled
"Lousy is the only word for it. But it was a take-it-or-leave it proposition, and wartime is no time for big business to stand on a peacetime principle." 28

With the start of World War II and the subsequent entry of Mexico on the side of the United States, Mexican petroleum problems were by no means solved over night. Her domestic consumption was still growing while production remained level. The few tankers she was able to get were sunk by German U-boat action. With the United States as a partner, Mexico did get some badly needed equipment. The United States permitted Pemex, the government oil agency, to have priority rights on a limited amount of equipment for operation and maintenance. This was the turning point. It marked the beginning of the breakdown of the boycott. The way was open for the recovery of Mexico's nationalized oil industry.
CHAPTER III

THE GOVERNMENT TAKES OVER - ADMINISTRATIVE,
LABOR AND MANAGEMENT PROBLEMS

In the post-expropriation period many problems beset the Mexican government. A critical problem involved the relations between labor and the government-operated oil agency Pemex (Petroleos Mexicanos). The general nature of this problem will thus be briefly considered first. Other aspects of the development of petroleum administrative and management policy by the Mexican government best lend themselves to chronological treatment and can be divided into three periods: a) pre-expropriations; b) Pemex operations up to the end of World War II and its reorganization; and c) Pemex since World War II. However, throughout these periods the labor problem was always significant.

Government and Labor

Once nationalization was established the government was face to face with the labor unions. Labor had taken credit for the expulsion of the foreign oil companies and it naturally expected to benefit a great deal. Mexican labor borrowed from Europe the doctrine that trade unionism must express itself in politics. In addition, a prevalent theory of Mexican trade unionism was based on a principle developed by Spanish syndicalism, which held that a fundamental aim of
organized labor was for the workers in a given factory or industry to own and operate the factory or industry as their own. The new government oil agency was thus confronted with a politically militant and radical oil workers' union. It might have been able to grant the conditions formerly demanded by the workers from the foreign oil companies if production had stayed at the same level, instead of falling drastically. However, with the loss of her world market and chaos in the domestic field, the government agency could not keep up with the increasing union demands.

An example of a typical problem the government agency faced is the following. A particular operation in the petroleum industry that took two or three American technicians now involved about thirty Mexican workers. Most of these men were political appointees or labor leaders. None of these men had any important technical experience. The total of their pay far exceeded that paid to the American technicians. The Mexican agency thus faced the serious problem of political influence in an industry that demanded efficient personnel to survive.

**Mexican Government Oil Agencies Before Nationalization**

To get a better understanding of the present government oil agency, Petroleos Mexicanos (Pemex), a brief survey of the background of Mexican government attempts to enter the oil business would be helpful.
The first step by Mexico to establish a government oil agency came in the regime of President Alvaro Obregon. In 1923 he reorganized the National Administration of Petroleum Control, the agency responsible for implementing government policy with respect to petroleum, and set up a new government-owned operating company called "Petromex." The aim of Petromex was to put the Mexican government into the oil business through a public corporation and to provide a nucleus for a government oil administration if nationalization of the petroleum industry became necessary.

No new developments or explorations were undertaken by this first agency. Petromex confined itself to drilling offset wells next to the oil fields of the foreign companies. To avoid the expense of exploring new fields Petromex set up an oil camp on properties adjacent to an already developed oil field and by this means tapped the fields of the foreign concerns. This practice was dangerous because very often the Mexican government oil camps would be located on the outer edge of the oil pool. Wells were drilled on this delicate edge of the petroleum layer creating a vacuum which would allow foreign substances from the outer edge of the well to pour in and ruin the well.

A critical view of the first operations of Mexican oil companies is given by William McMahon:
It is not possible to calculate the millions of barrels of oil virtually stolen by this process. . . . One can only guess at the value of oil, still lying in underground deposits, which these blunderers ruined. But this is certain, these [Mexican] Companies, founded to develop the oil resources of Mexico and so add to the national wealth, merely whittled away the resources and decreased the wealth. And at that, the venture ended in bankruptcy.

Petromex proved inadequate among other reasons, because of its preference for executives with political influence over those of proven technical ability. The company was always in financial trouble and had a difficult time raising capital for operations. Mexican investors were suspicious of Petromex because of the uncertainty of the Revolutionary government and their lack of faith in the government to deal with the techniques of the oil industry.

By 1937, it was clear that Petromex had failed to establish the Mexican government in the oil business. On January 30, 1937 the Mexican government established the National Petroleum Administration to replace both the National Administration of Petroleum Control, the regulatory public agency, and Petromex, the government operating company. President Lazaro Cardenas' expropriation decree came on March 18, 1938 and on March 21, 1938, under the National Petroleum Administration, an Administrative Council of Petroleum was set up consisting of six government representatives and three representatives of the syndicate of petroleum workers. This
administrative council then set up Petroleos Mexicanos (Pemex). Mexican petroleum has remained under control of Pemex up to the present time.32

Pemex Operations to the End of World War II

In 1938 the National Petroleum Administration had no money, no skilled technicians, three run down factories and about forty dilapidated drilling rigs. In 1950 the reorganized agency claims it paid over 400,000,000 pesos in taxes to the government from its profits. What were the reasons for this remarkable recovery?

Once nationalization was established labor union leaders took over key positions in Pemex. The foreign oil companies had resisted all attempts to have the labor leaders take over these important administrative positions. The foreign companies' prediction that management by labor would ruin the oil industry seemed to come true when on August 22, 1939 a presidential decree reorganized the government petroleum industry because of inefficiency. The presidential decree took out of control of the labor unions several hundred positions of an administrative and technical nature.33

The oil industry limped and stalled. It was inevitable that the industry would have trouble due to inefficiency, lack of equipment and capital, foreign pressure, etc. In March of 1941 Pemex had further trouble with labor. The petroleum
administration carried out a drastic reorganization plan in the face of stubborn syndicate opposition. Pemex dismissed approximately 1,900 oil workers. The employees dismissed were those who entered the industry after the 1938 expropriation decree. Pemex ordered the housecleaning to reduce operating expenses. Pemex secured the approval of the Federal Labor Board to discharge the workers.

Despite this temporary setback, the petroleum workers were still very influential in the Pemex agency. Although a few high administrative posts were taken away from the labor leaders in the reorganization of Pemex on August 22, 1939, trade union officials still held many positions of importance. Because of its part in the expropriation, the petroleum syndicate was one of the strongest unions in Mexico. There were a number of work stoppages during the early years of government operations in which the Cardenas and Avila Camacho governments did not interfere. Pemex officials and union leaders at times made various proposals intended to increase production and create harmony in the petroleum industry but very often they were at odds on what policy to pursue.

**Mexico Enters the World War**

When President Avila Camacho took over the government on December 1, 1940 relations between the United States and Mexico had begun to improve. The Avila Camacho administration
cooperated with the United States in setting up a program for continental defense in April, 1941. With Mexico and the United States drawing closer together, relations between Mexico and Germany began to deteriorate.  

Under the agreement of April, 1941, Mexico allowed the United States to use its roads, air bases, etc., to ship troops and material to the Panama Canal zone. Mexico later pledged itself to export essential strategic war materials to the United States. The United States reciprocated by various means which included: 1) promise to help stabilize the peso; 2) allow Pemex to get essential equipment for operations; and 3) promise to Pemex of capital and technological assistance to build a refinery in Mexico at the end of the world crisis.

Japan's surprise attack on Pearl Harbor on December 7, 1941 resulted in Mexico's severing diplomatic relations with Japan, Germany and Italy in February, 1942 and Mexico, "pledged sincere solidarity and cooperation in the war that has now come to the Americas."  

Mexico soon learned the cost of abandoning her neutrality when on May 13, 1942 an Axis U-boat sunk the 6,132 ton tanker Potrero del Llano. While an ultimatum was on its way to Germany over this incident, another Mexican tanker was sunk off Cuba. As a result of these two incidents President Avila Camacho on June 1, 1942 asked and received
Congressional approval of a declaration that a state of war had existed since May 22, 1942 between Mexico and the Axis powers. 36

There was considerable domestic pressure against this declaration of war. The protests subsided when President Avila Camacho promised that Mexico would confine her actions in the war to the defense of her country and would not have to send troops abroad. With these promises, Mexican labor backed the government in unifying the home front when, "on July, 1942...an over-all-non-strike, non lockout truce was signed between representatives of the principle labor organizations and industrialists of Mexico, 'suspending' capital and labor bickering for the duration of the international crisis." 37 The Pemex agency was now assured of relatively peaceful labor relations for the duration of the war.

In May, 1943, Efrain Buenrostro, the head of the government petroleum administration, attempted to get a loan from the United States to build a much needed refinery. The United States and the Mexican government had already settled the oil companies claims. The United States agreed to send machinery and equipment and also set up plans for a new high octane gas plant in Mexico.

Some equipment and markets were now available but the petroleum agency was still badly organized. There was a
fairly upward trend in production, but as has already been mentioned, domestic consumption increased every year. New fields had to be opened to keep up with demand and refineries built. The serious equipment shortages during the war made this much needed exploitation and expansion impossible.

The first eight years of government oil operations showed little progress. This period was marked by indecision on the part of Pemex officials and technical ignorance nevertheless, by the end of World War II production had risen slowly. In 1945 Pemex produced 45,457,000 barrels which was 3,360,000 barrels less than in 1937, the last year of foreign oil production. More encouraging during the first eight years was the drilling activity. From 1938 to 1945 Pemex drilled 258 new wells. Of these forty-five were at the rich Poza Rica fields.38

Pemex Since World War II

At the end of World War II, in 1945, Pemex entered its most progressive period. One of the first moves of President Miguel Aleman, when he took office in December, 1946 was the appointment of Federal Senator Antonio J. Bermudez as the head of Pemex. A millionaire, a successful business administrator and owner of the Waterfill Frazer whisky distillery in Ciudad Juarez, he accepted the job of running Pemex as a "dollar a year man." Although Bermudez was not a professional oil man he was recognized as one of
the most competent executives ever to accept an important position in the Mexican government. The degree of progress made by Pemex since the war can be attributed directly to the business-like manner in which Bermúdez has conducted the affairs of the company.39

Bermúdez faced a difficult task when he took over in December, 1946. Pemex was still full of political appointees and much capital was needed for expansion. President Aleman's petroleum plans called for 7,250 new wells which would quadruple production. The big obstacle was the lack of capital for this 6,000,000 dollar plan. President Aleman faced a political problem because of his need of foreign capital to put his plan into effect.

One stumbling block could be the attitude of ex-President Lázaro Cárdenas who might call this a surrender to the foreign companies. Opposition would also come from labor's leftist spokesman, Vicente Lombardo Toledano. The cry of foreign imperialism would again arouse the country. It would be an easy job to excite the masses who associated Standard and Shell with the bombing of Vera Cruz by the United States Navy in 1914. But President Aleman and Bermúdez took the risk and tried to negotiate with independent American oil companies. These companies, which operated on a marginal basis, wanted guarantees of long tenure and assurance against labor strife.40 It took Bermúdez a few
months to get organized but when he did the whole Pemex agency and the country knew it. Bermúdez obtained the union's permission to fire five thousand of the twenty-three thousand workers employed by Pemex. The Petroleum Workers Syndicate, which was considered Mexico's fastest striking union, meekly submitted to Bermúdez's action.

To understand the unions acquiescence to the firing, a brief note must be given on the petroleum workers strike of December 23, 1946. Jorge Ortega, the hot tempered union head, called a strike, but this time the government fought back. This action by the government, in breaking up the strike showed how serious were its plans for the reorganization of Pemex. Unlike other disputes between labor and Pemex, President Alemán struck back at labor and sent out soldiers to break up the strike.\(^{41}\)

Bermúdez promised more cleaning up in the oil agency. This first large scale reorganization by Bermúdez allowed Pemex to save 4,000,000 pesos from the workers' salaries. Bermúdez said, "we have more oil than Venezuela and it is our job to get it up. When I get through, every man in Pemex is going to be on his toes, anxious to win a good record and improve the organization."\(^{42}\)

Bermúdez had made a vigorous start but he still faced many difficult problems. In 1937, before expropriation, the payroll of the foreign oil companies amounted to
56,000,000 pesos. In 1941 it went up to 91,000,000 pesos under Pemex. When Bermudez took over in 1946, the payroll was over 216,000,000 pesos. The number of workers in the oil fields increased from 13,120 in 1937 to 24,726 in 1946. These figures should indicate an expanding industry yet there was no appreciable increase in production. To make the situation serious the production that was achieved resulted from the dangerous practice of over-pumping existing wells which meant a serious loss of part of the reserves.43

Relations between Pemex and labor have been much more cordial since the government stopped the workers' strike of December 1946. The following article taken from the New York Journal of Commerce, gives the latest agreement between Pemex and the oil workers:

A new collective contract signed by the administration of Petróleos Mexicanos and the National Union of Oil Workers increases the total of wages of 22,000 Pemex workers by 74,000,000 pesos over a period of twenty-four months. The contract will be effective until May 31, 1953.44

Despite the lack of funds, trained personnel and equipment Pemex has made tremendous progress from 1948 to 1951. Pemex in 1950 produced 72,117,000 barrels of petroleum and when one compares this to the 1942 production of 34,815,000 barrels, the increase is remarkable.45 To get a better understanding of these production figures, a closer
view of Mexican petroleum production since nationalization will be appropriate.
CHAPTER IV

PETROLEUM PRODUCTION

The picture we have seen of the tremendous production advance of Pemex under Bermudez was certainly a far cry from the dismal years following nationalization. The success of the Mexican venture into the oil business hung in the balance during those early years of operation. Everything seemed to go wrong when the government took over the petroleum industry in 1938. To get a better understanding of the production problems Pemex faced, it is necessary to go into a more detailed analysis of what has happened to production from nationalization to the present time.

When the Mexican government expropriated the foreign oil properties, the primary job of Pemex was: 1) to get the petroleum out of the ground; and 2) to refine the petroleum. This chapter will deal with production of crude petroleum and refining capacity. The main products of Mexico's refineries will be discussed in the next chapter.

As we have noted before, the settlement between Mexico and the United States in 1942 over compensation for properties confiscated from the American oil companies, marks the turning point of Mexico's venture into the petroleum industry. It is convenient then, for our purposes here, to divide Mexican petroleum production into two periods; 1) from
1938 to 1942, and 2) from 1943 to 1951.

Also to be considered in dealing with the overall problem of production are the areas in which this production took place. Of all Mexican petroleum production since expropriation, 90 per cent has come from the 1,600 square mile Tampico basin area in the northern part of the state of Vera Cruz. 46

Production and Refining Difficulties of the Government Petroleum Industry

The foreign oil companies in their last year in Mexico, 1937, produced 46,907,000 barrels of crude oil. The new Mexican government agency in 1938 produced 38,506,000 barrels. This drop in production was inevitable because of the restrictions the government agency faced. The main reasons for the inability of Pemex to increase crude production of petroleum and its refining capacity during those early years of operation may be summarized as follows: 1) the loss of markets because of reprisals by the expropriated oil companies; 2) difficulties in replacing worn out machinery; 3) lack of tankers to export oil to new markets; 4) lack of technicians and oil know-how; 5) political influence in the agency; 6) constant labor strife which hampered efficiency; 7) World War II and the subsequent loss of the few markets Mexico had; and 8) lack of capital for exploration, repairing existing refineries and building new refineries to
meet the increasing domestic demand. All these problems and others will be brought out again when we deal with specific periods of production.

Production of Crude 1938 to 1942

The discouraging picture of Pemex production during this period is revealed in the following table:

TABLE III

MEXICAN CRUDE PRODUCTION FROM 1938 TO 1942

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>1937</td>
<td>46,907,000</td>
</tr>
<tr>
<td>1938</td>
<td>38,506,000</td>
</tr>
<tr>
<td>1939</td>
<td>42,898,000</td>
</tr>
<tr>
<td>1940</td>
<td>44,036,000</td>
</tr>
<tr>
<td>1941</td>
<td>42,196,000</td>
</tr>
<tr>
<td>1942</td>
<td>34,815,000</td>
</tr>
</tbody>
</table>

Exports of crude petroleum dropped from 24,560,000 barrels in 1937 to 8,564,000 barrels in 1938, though the main factor here was the boycott by the expropriated companies. The increase of production that was achieved by Pemex from 1938 to 1941 resulted from the dangerous practice of over-pumping existing wells which meant a serious loss of part of the reserves. Add to this the facts that: 1) up to the expropriation the average life of a Mexican well was only eight years; and 2) almost no new explorations were undertaken in the 1938 to 1942 period. Hence the decline in 1942 reversed the slight upward trend of 1938 to 1941 and brought production to a lower level than 1938. The 1942 production represents the lowest production figure since the 34,001,000 barrels in 1933 under foreign oil concerns.
The beginning of World War II and the entry of Mexico on the side of the Allies on June 1, 1942 at first put the Mexican petroleum industry in a perilous position. Mexico during the 1938 to 1941 period had developed new markets for her petroleum in Europe. During the period between expropriation and the Japanese attack on Pearl Harbor Mexico sent 65 per cent of her petroleum exports to Europe. Most of this new trade was with Germany. The total of Mexican petroleum exports in 1940 was 18,733,000 barrels and in the troubled years of 1941 and 1942 petroleum exports dropped to 13,744,000 and 6,303,000 barrels respectively.

Despite these early adversities World War II turned out to be the saviour of the Mexican petroleum industry. The losses of petroleum exports to Europe were partly offset by the increase in domestic consumption and the development of an important market in Cuba. Another factor which helped Mexico was the addition to her maritime transportation fleet of twelve Axis ships which were seized by the government in Mexican harbors in June, 1942 when Mexico declared war against Germany, Italy and Japan.

The turning point in Mexican petroleum production came after the low point reached in 1942. As previously pointed out, the United States government in the interests of wartime hemispheric solidarity, pressed the expropriated American oil companies to settle their claims. The United
States then sent technical experts and some badly needed equipment to Mexico. Pemex was given priority rights on a limited amount of equipment for operations and maintenance. The United States was again available as a market for Mexican petroleum.

**Production of Crude 1943 to 1951**

As the following table shows there was a steady upward trend in production beginning with 1943:

<table>
<thead>
<tr>
<th>Year</th>
<th>Production (barrels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1943</td>
<td>35,163,000</td>
</tr>
<tr>
<td>1944</td>
<td>38,302,000</td>
</tr>
<tr>
<td>1945</td>
<td>43,547,000</td>
</tr>
<tr>
<td>1946</td>
<td>49,235,000</td>
</tr>
<tr>
<td>1947</td>
<td>56,284,000</td>
</tr>
<tr>
<td>1948</td>
<td>58,508,000</td>
</tr>
<tr>
<td>1949</td>
<td>60,910,000</td>
</tr>
<tr>
<td>1950</td>
<td>72,117,000</td>
</tr>
<tr>
<td>1951</td>
<td>76,000,000*</td>
</tr>
</tbody>
</table>

*estimated

Although the United States permitted Pemex to secure priority rights on some equipment for operations and maintenance, the government agency still had a difficult time. Domestic consumption of refined petroleum in Mexico had increased much more rapidly than the production of crude. Crude production increased from 34,815,000 barrels in 1942 to 35,163,000 barrels in 1943 while domestic consumption jumped from 30,123,000 barrels in 1942 to 33,197,000 barrels.
in 1943. Unless new wells were drilled Mexican consumption
would overtake the production of crude. During the war
period new explorations were limited because of shortages
of essential equipment. Pemex confined its limited explora-
tion program to areas known to be oil-bearing. The cost in
capital and equipment was too much to attempt the develop-
ment of new areas.

With the end of World War II in 1945, Mexico's
petroleum picture was much brighter. From 1947 on, Pemex
entered its most progressive period of production. From 1945
to 1951 the production of crude petroleum was nearly doubled.
The two main factors for this tremendous increase in
production were: 1) the ability of Pemex to get essential
equipment at the close of the war; and 2) the reorganiza-
tion of Pemex in December 1946. The change of administration
has already been discussed. Suffice it to say here that
many of the man-made difficulties of that agency were solved
by Bermúdez. The more farsighted policies of Bermúdez made
for a more favorable situation.

President Aleman and Senator Bermúdez in 1947 formu-
lated a six year plan which aimed at quadrupling petroleum
production. Under this plan 7,250 new wells were to be
drilled. The chief problem was the need for 6,000,000
dollars for this exploration project. Help from the United
States was contemplated but pressure from the expropriated
American oil companies and the forces in Mexico hostile to the return of American capital in the oil industry both combined to check any proposed loan. The only way Bermúdez could get any capital for exploration was to deal with independent American oil men. These independent oil men wanted guarantees that they would not suffer the same fate as the expropriated companies in 1938, and assurance against labor troubles. Capital and equipment were badly needed but Bermúdez in his first years had to be cautious. His exploration plans had to wait for a more favorable time.

In 1946 Mexican exports of petroleum were seriously curtailed. Crude production had increased approximately 6,000,000 barrels over the 1945 production figure but in the same period domestic demand for petroleum products had increased approximately 4,000,000 barrels. This meant a serious curtailment of petroleum for exports. This increase in the domestic demand meant that Pemex had less crude petroleum available to earn badly needed foreign currency for capital and equipment.

In the first year under Bermúdez, 1947, Pemex increased its production of crude petroleum. Production rose from 49,235,000 barrels in 1946 to 56,284,000 barrels in 1947. This year marked an important event for Mexico. After a nine year controversy, Mexico had finally settled the
oil expropriation quarrel with Britain. New markets were now available for crude petroleum. As a result of the increase in production and better relations with England, Mexico in 1947 exported 14,508,000 barrels of petroleum. This was the highest amount exported by Pemex since 1941.

The following two years, 1948 and 1949, marked a temporary halt in the rapid increase in the production of crude petroleum. The following table shows that although production increased during 1948 and 1949; it was not as much as the 1944 to 1947 period:

**TABLE V**

**COMPARISON OF PRODUCTION FOR THE YEARS**
**1944 TO 1947 AND 1948 AND 1949**

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1944</td>
<td>38,302,000</td>
<td>+3,139,000 (over previous year)</td>
</tr>
<tr>
<td>1945</td>
<td>43,547,000</td>
<td>+5,245,000</td>
</tr>
<tr>
<td>1946</td>
<td>49,284,000</td>
<td>+5,737,000</td>
</tr>
<tr>
<td>1947</td>
<td>56,284,000</td>
<td>+7,000,000</td>
</tr>
<tr>
<td>1948</td>
<td>58,508,000</td>
<td>+2,224,000</td>
</tr>
<tr>
<td>1949</td>
<td>60,910,000</td>
<td>+2,402,000</td>
</tr>
</tbody>
</table>

The reasons that the rate of increase in crude petroleum production during 1948 and 1949 fell as compared with the three previous years was the inability of Pemex to develop new wells. Exploration work was limited because of the lack of funds, trained personnel and equipment. When Pemex took over the oil fields in 1938 many of them were in their infancy. Pemex drained these fields as fast as it could and by 1948 and 1949 many of these wells were depleted or near depletion.
Bermúdez realized, when he took over the directorship of Pemex, that unless new wells were drilled the production of crude petroleum would fall considerably in future years. To be able to drill new wells Pemex needed capital and oil know-how but neither were available in Mexico. Bermúdez had started negotiations with independent American oil men but the contracts he was able to secure were limited. Thus in order to facilitate new drilling activities, Bermúdez, with the backing of President Aleman began to negotiate with major oil companies.

The following passage from Sanford Mosk's work, *Industrial Revolution in Mexico* aptly summarizes the nature of the problem faced by President Aleman in trying to secure new American investments to develop Mexican petroleum production:

The solution he has hit upon for this problem is to hire foreign companies to work petroleum resources for the Mexican government, paying them for their services in oil rather than in cash. This policy began to take shape in 1947. 

In April, 1948, it was announced that a contract of this type had been concluded with the Cities Services Company. This transaction, however, was a special case because Cities Service Company, through a Mexican subsidiary, still had control of some lands in Northeastern Mexico, which had not been subject to expropriation in 1938. Agreements with other American oil companies were much more difficult to arrive at. In June it was reported that fifteen American companies had turned down contracts on the ground that the terms offered by PEMEX
involved too much risk. The company which did the drilling, it was pointed out, would have to bear the entire loss if no oil was struck. No further arrangements had been concluded by the end of 1948, but negotiations were going on all the time, and occasionally statements made on both sides of the border suggested that bargaining was bringing PEMEX and American oil companies closer together. As the year drew to a close, therefore, additional contracts for drilling appeared probable. 51

Additional exploration contracts with American oil companies did follow. A more detailed account of the return of American capital into Mexico's oil industry will be given later. Suffice it to say here that the results of the new drilling activity involving United States capital became apparent in 1950 when the production of crude petroleum was increased 12,000,000 barrels over the 1949 production figure. The latest estimate of crude production in 1951 shows that PEMEX will produce approximately 76,000,000 barrels. With new exploration plans under way PEMEX hopes to expand oil production nearly three fold by 1956. 52

Thus, under the directorship of Bermúdez, 1947 to 1951, PEMEX has increased the production of crude petroleum by 65 per cent. Although Bermúdez has done a remarkable job we must take into account the fact that PEMEX has not reached its present position without the aid of private American capital. 53

Areas of Production

The operations of PEMEX have been frequently pointed
out as the shining example of a successful government operation of an oil industry. However, little mention is made of the fact that Mexico's production increases have come from the properties expropriated in 1938 from foreign oil companies. Pemex has not discovered any important fields since nationalization.\textsuperscript{54} Mention should be made that the increased output of petroleum is due entirely to the rich Poza Rica field in the Tampico basin of Vera Cruz.

Only sixteen wells were completed at Poza Rica when the expropriation came. This field produced 18,620,000 barrels in 1937, the last year of private operations. This was a daily average of 51,013 barrels. Intensive drilling in this proven area by Pemex has pushed production of crude petroleum to an average of 128,000 barrels per day by 1950. This represents a daily increase of 77,000 barrels for the Poza Rica fields from 1937 to 1950.\textsuperscript{55} The following table shows the important role played by the Poza Rica fields in the total crude production of the Mexican petroleum industry:
TABLE VI

STATISTICAL SUMMARY
OF THE PART PLAYED BY THE POZA RICA FIELD
IN THE MEXICAN PETROLEUM INDUSTRY56

Crude Production*

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Poza Rica</th>
<th>Other Fields</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-expropriation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1933</td>
<td>34,001</td>
<td>..........</td>
<td>34,001</td>
</tr>
<tr>
<td>1934</td>
<td>35,172</td>
<td>3,772</td>
<td>34,450</td>
</tr>
<tr>
<td>1935</td>
<td>40,241</td>
<td>10,940</td>
<td>29,751</td>
</tr>
<tr>
<td>1936</td>
<td>41,028</td>
<td>14,220</td>
<td>26,808</td>
</tr>
<tr>
<td>1937</td>
<td>46,907</td>
<td>18,620</td>
<td>28,286</td>
</tr>
<tr>
<td>Expropriation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1938</td>
<td>38,506</td>
<td>22,000</td>
<td>16,506</td>
</tr>
<tr>
<td>1939</td>
<td>42,898</td>
<td>26,300</td>
<td>16,598</td>
</tr>
<tr>
<td>1940</td>
<td>44,036</td>
<td>28,350</td>
<td>15,686</td>
</tr>
<tr>
<td>1941</td>
<td>42,196</td>
<td>25,800</td>
<td>16,396</td>
</tr>
<tr>
<td>1942</td>
<td>34,315</td>
<td>19,850</td>
<td>14,965</td>
</tr>
<tr>
<td>1943</td>
<td>35,163</td>
<td>20,540</td>
<td>14,623</td>
</tr>
<tr>
<td>1944</td>
<td>38,302</td>
<td>21,460</td>
<td>16,743</td>
</tr>
<tr>
<td>1945</td>
<td>43,547</td>
<td>22,949</td>
<td>20,598</td>
</tr>
<tr>
<td>Post-war</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1946</td>
<td>49,335</td>
<td>26,213</td>
<td>23,022</td>
</tr>
<tr>
<td>1947</td>
<td>56,284</td>
<td>31,951</td>
<td>24,333</td>
</tr>
<tr>
<td>1948</td>
<td>58,508</td>
<td>36,500</td>
<td>22,008</td>
</tr>
<tr>
<td>1949</td>
<td>60,910</td>
<td>36,660</td>
<td>24,250</td>
</tr>
<tr>
<td>1950</td>
<td>72,117</td>
<td>46,716</td>
<td>25,401</td>
</tr>
</tbody>
</table>

* thousands of barrels annually

With the exception of the newly developed northeastern fields, Mexican petroleum production has come from fields developed by foreign oil companies before 1938. Pemex has concentrated its exploration on these proven fields.
The following table shows the chief districts of petroleum production in Mexico since nationalization:

<table>
<thead>
<tr>
<th>District</th>
<th>Year of discovery</th>
<th>Crude production for 1950 (barrels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isthmus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tabasco:</td>
<td>1921</td>
<td>7,019,834</td>
</tr>
<tr>
<td>Vera Cruz:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chihuahua:</td>
<td>1948</td>
<td>624,034</td>
</tr>
<tr>
<td>Coahuila:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tamaulipas:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Luis Potosi:</td>
<td>1901</td>
<td>8,795,444</td>
</tr>
<tr>
<td>Tamaulipas:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vera Cruz:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poza Rica</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vera Cruz:</td>
<td>1930</td>
<td>46,716,165</td>
</tr>
<tr>
<td>Southern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puebla:</td>
<td>1908</td>
<td>8,962,121</td>
</tr>
<tr>
<td>Vera Cruz:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Unless Pemex develops new production areas it will not be able to maintain its present level of production. The estimate of petroleum reserves of Mexico has increased from 950,000,000 barrels to 1,300,000,000 barrels in the past five years. Most of this increase has been the result of extensive development of the existing fields. In 1950
Pemex accelerated its exploratory program and a few potential areas have been located.\textsuperscript{59}

Refining Capacity of Pemex Since Nationalization

Production of crude petroleum at first was the main problem of Pemex but through the years refining has become increasingly important. Petroleum consumption continued to expand as new industries were developed and as Mexico increased her transportation facilities. Because of her lack of refining facilities Mexico has always been an importer of refined petroleum products.

Although the following statement represents the view of Standard Oil of New Jersey, the heaviest American loser in the expropriation, it goes a long way in explaining the difficulties Pemex faced in producing and refining petroleum:

In refining, as in producing Mexico's record leaves much to be desired. The operation of oil refineries is in itself a highly specialized, technical process. It requires not only expert management, but also men with extensive practical experience. Frequent technical changes in the industry are establishing new ways of producing more efficiently and are developing new petroleum products. Unless refining technique is maintained at a high level, the quality of the product is sure to decline and will not meet the rigid specifications required in many markets. The erection, operation, and maintenance of refineries like the development of new fields, require large amounts of capital. Frequent changes in installations have to be made to keep up with changing methods of refining and of producing and utilizing by products.\textsuperscript{60}
That Pemex would have a difficult time running the expropriated refineries efficiently became apparent in the early years of operation. The products produced by her refineries fell below the minimum requirements for efficient use. The gasoline and kerosene produced clogged feed lines. As Pemex gained experience in refining know-how it was able to produce more efficient products but its refineries were not developed enough to keep up with the domestic demand of refined products. In the next chapter, which deals with petroleum consumption, we will go into more detail on Mexico's dependency on imports of refined petroleum products.

When Pemex took over the refineries in 1938 it faced the following problems:

1) During the troubled years before expropriation the foreign oil companies limited development and repairs to a minimum.
2) Pemex lacked skilled technicians on the executive and development level.
3) The refineries were run down and equipment was badly needed for operations.
4) Domestic demand of refined products increased yet Pemex had difficulties replacing worn out equipment to get the refineries operating, let alone increase capacity.
5) With reprisals by the foreign oil companies, essential equipment was impossible to get. The United States, Britain and the Netherlands were the only countries with technical
know-how and equipment to help Pemex solve its refining problems.

With the settlement between Mexico and the United States in 1942 the future of Pemex's refining operations became encouraging. The hope of increasing refining capacity became assured when on July 1, 1943 the United States promised to send equipment and machinery to Mexico. The United States government also set up plans to facilitate the construction of a high-octane plant in Mexico. This plant was to be built at the end of the war. 61

The refining capacity of the Pemex-operated plants in 1938 was 120,000 barrels a day. In 1941, due to the problems already mentioned, refining capacity dropped to 99,800 barrels a day. By September, 1943 with help from the United States, the refining capacity of Pemex plants increased to 150,000 per day. 62

The end of World War II marks the beginning of rapid progress for Pemex's refining operations. Capital and equipment were now available. With United States help, an 18,000,000 dollar refinery was started at Salamanca in the state of Guanajuato. 63 This refinery was completed early in 1950. It has a capacity of 30,000 barrels per day. This was the first in Pemex's plan to build refineries close to areas of consumption. During the same period Pemex started the renovation and amplification of the refinery at
Aycapotyalco, on the outskirts of Mexico City. Reconstruction was completed in 1950. The following table shows the 1951 refineries of Pemex:

**TABLE VIII**

<table>
<thead>
<tr>
<th>District</th>
<th>Location of plant</th>
<th>Crude charging capacity (barrels daily)</th>
<th>Cracking capacity (barrels daily)</th>
<th>Type of refinery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Mexico:</td>
<td>Atycapotyalco (Mexico City)</td>
<td>50,000</td>
<td>12,800</td>
<td>Complete</td>
</tr>
<tr>
<td></td>
<td>Salamanca</td>
<td>30,000</td>
<td>5,000</td>
<td>Distillation</td>
</tr>
<tr>
<td>Isthmus:</td>
<td>Minatitlán</td>
<td>24,000</td>
<td>......</td>
<td>Distillation</td>
</tr>
<tr>
<td>Northern Mexico:</td>
<td>Reynosa</td>
<td>4,000</td>
<td>......</td>
<td>Distillation</td>
</tr>
<tr>
<td>Poza Rica:</td>
<td>Poza Rica</td>
<td>4,000</td>
<td>......</td>
<td>Skimming</td>
</tr>
<tr>
<td>Tampico:</td>
<td>Arbol Grande</td>
<td>22,000</td>
<td>......</td>
<td>Skimming</td>
</tr>
<tr>
<td></td>
<td>Cindad Madero</td>
<td>75,000</td>
<td>4,600</td>
<td>Skimming</td>
</tr>
<tr>
<td></td>
<td>Mata Redonda</td>
<td>15,000</td>
<td>5,800</td>
<td>Skimming</td>
</tr>
</tbody>
</table>

From a low of 99,000 barrels per day in 1941 Pemex has upped refining capacity to 282,000 barrels daily in 1951. Most of this increase has come with the help of United States capital and technology. The refining problems of Pemex have by no means been solved. Many new refineries must be built to lower the amount of imports of refined products.

The future prospects of Pemex's refining operations depends mainly on its ability to attract additional foreign
capital. The revenue received from exports of crude petroleum is not significant enough to provide capital for large scale expansion in both petroleum production and refining capacity. In addition, also train personnel in the latest techniques of refining to insure better products and the utilization of by-products.
CHAPTER V

PETROLEUM CONSUMPTION AND INDUSTRIAL DEVELOPMENT

As we have seen, the production of crude petroleum under Pemex has shown remarkable progress. From expropriation in 1938 to the present time crude production has increased an average of 15 per cent a year, but during the same period domestic demand for petroleum products increased 12 per cent a year. Domestic consumption rose from 24,006,000 barrels in 1938 to 59,648,000 barrels in 1950. If domestic demand increases at the rate it has in the past few years Mexico by 1956 will be consuming some 90,000,000 barrels of petroleum products.

Thus Pemex not only has had the problem of getting more petroleum for exports, but also that of keeping ahead of the domestic demand. This increase in the domestic demand was one of the important factors which forced the Pemex leaders to seek foreign aid in 1947 for the development of new fields.

The main reasons for this increase in consumption since 1938 may be summarized as follows: 1) the rapid industrialization of Mexico especially during and after World War II; 2) the increase of Mexico's transportation facilities, and 3) the action by the government in restricting the use of wood as fuel.

Consumption of such refined products as motor fuel,
kerosine, lubricating oil, etc., have all risen steadily since 1938. Because of the increase in the domestic demand Mexico has had to import more refined products each year. In 1950 Mexico imported 7,450,000 barrels as compared to 1,670,000 barrels in 1938. The increase is considerable, and its chief significance is that these imports are costing Mexico a great deal of her limited foreign exchange. A big percentage of these products are imported from the United States. Almost all the petroleum products are those which require an elaborate refining process, and hence are costly.

The exports and imports of petroleum products have been of vital importance to the Mexican economy. Although about 60 per cent of the people still make their living from the land (according to estimates based on preliminary returns of the 1950 census), the economy of Mexico depends to a large degree on her extractive industries. The part played by petroleum has been of great importance as shown by the near collapse of the Mexican economy after expropriation in 1938. The recent industrial development of Mexico has not matured enough as yet to become a decisive factor in the Mexican economy. Mexico is under pressure, on the one hand, to export petroleum to get essential machinery for development, and on the other hand to restrict her imports of refined products so that foreign exchange will be available for vitally needed equipment.
Domestic Demand and Industrial Development

Petroleum consumption in Mexico continued to expand as new industries were established. From 1940 to 1944 there were three major difficulties hindering industrialization of Mexico: 1) impossibility of securing equipment; 2) shortage of power; and 3) little or no improvement in transportation, involving lack of motor vehicles, lack of a good highway network and of an efficient railroad system. Many of these problems have been partially solved today. One of the chief reasons for the progress of Mexican industries has been Pemex's ability to supply the power needed.

The impetus for the recent development of industry came with World War II. Mexico as many other underdeveloped areas, was faced with serious shortages during the war. As a result, small industries were established overnight. Mexico, which was never considered an exporter of manufactured goods, made remarkable progress in this respect during this period. From 1937 to 1939, of the total of Mexican exports, 1.5 per cent was in manufactured goods. In 1946 these exports amounted to 34.3 per cent. The chief products involved in this great increase were cotton cloth, footwear, and beer. During the war Pemex had a difficult time in supplying these new industries. The use of petroleum in industry was complicated by high costs in transportation and the irregularities of supply.
Oil is not only the major current source of power in Mexico, but prospects of petroleum reserves are much brighter than any other possible source of power. (See Table IX, ENERGY FROM OIL COMPARED TO OTHER SOURCES). There is no doubt that Mexico has very large reserves of petroleum. The problem is that of exploring new areas to keep her present and future industrial establishments running.

The prospects of using coal for industrial development is not as favorable as petroleum. The known utilizable deposits are relatively small and are in the north central areas of Mexico. The difficulties of transportation to the industrial areas of central Mexico makes this a highly costly process. The use of wood as fuel for industry will be discussed shortly.

Up to the end of World War II, water power was the main source of energy for industry but with the tremendous increase of manufacturing during and after the war, water power has not been able to keep pace with the growing demand for energy. Industries for the most part have had to rely on the use of fuel oil.

One of the dominant features of the Aleman administration has been its stress on the expansion and development of industry. Whether Mexico can continue her new industrialization program is, of course an open question. The answer to this question lies, in part, in the ability of
with the industrial development. At the end of World War II Mexico began to improve her transportation system. In 1945 Mexican vehicles consumed 14,300,000,000 liters of gasoline. In 1949 consumption grew to 1,716,900,000,000 liters. This increase shows the extent of motorization of the Mexican transportation system and the burden placed upon Pemex to supply this increasing market. More increases were forthcoming. From January to May of 1951 Mexico spent 40,000,000 dollars for imports of motor vehicles and parts. This was an increase of 233 per cent over the same period in 1950. This increase places an added burden on Pemex's refineries and limits its ability to export more petroleum.

With the increase in the use of motor vehicles in Mexico, the government began the expansion of its highway system. Of special importance in Mexico's network of highways is the 1,750 miles of the Pan-American highway. The tourist business has been growing steadily. Mexico has increased the number of gas filling stations along this route. In 1946 there were a total of 1,200 filling stations in Mexico. Of this total only two-hundred stations were in
the vicinity of Mexico City. Most of the stations were situated along the main routes traversed by tourists.

There has also been a notable increase in the development of Mexico's commercial aviation system. The following table shows the extent of Mexico's rapid progress in air transportation:

TABLE X

INCREASE OF COMMERCIAL AVIATION IN MEXICO

<table>
<thead>
<tr>
<th>Year</th>
<th>Miles flown</th>
<th>No. of passengers</th>
<th>Mail and cargo shipped in pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1937</td>
<td>3,500,000</td>
<td>70,000</td>
<td>6,300,000</td>
</tr>
<tr>
<td>1947</td>
<td>21,400,000</td>
<td>773,000</td>
<td>58,800,000</td>
</tr>
</tbody>
</table>

Commercial aviation has kept on expanding since the end of World War II. The significance of this growth to the Mexican petroleum industry is that Pemex has been unable to supply high test gasoline for her planes. Most of the high test gas is imported from the United States.

**Government Orders Mexicans to Use Petroleum**

During the regime of President Avila Camacho, the government ordered landlords to furnish kerosene stoves for their tenants, thereby replacing wood burning units. Mexico was rapidly denuding her forests. About 80 per cent of the lumber cut was used for fuel. President Avila Camacho's order served two purposes: 1) relieved the serious deforestation of Mexico, and 2) provided a market for
Pemex's products.

During the war, petroleum exports were seriously curtailed. The increase in the use of oil as fuel for dwellings gave Pemex a market for its surplus petroleum. As more dwellings converted to petroleum fuel for cooking and heating, the demand for this source of energy grew.

Thus we have seen that Mexico has gone through a profound change in the development of her economy. In almost every activity the use of petroleum has been of vital importance.

Pemex Refining Capacity and Data on Increase of Domestic Consumption

The internal consumption of petroleum products increased from 39,644,000 barrels in 1946 to 59,648,000 in 1950. A breakdown of the amount of petroleum consumed by Mexico since the expropriation is given in the following table:
### TABLE XI

**DOMESTIC CONSUMPTION OF CRUDE PETROLEUM SINCE NATIONALIZATION**

<table>
<thead>
<tr>
<th>Year</th>
<th>(barrels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1938</td>
<td>24,006,000</td>
</tr>
<tr>
<td>1939</td>
<td>26,095,000</td>
</tr>
<tr>
<td>1940</td>
<td>27,113,000</td>
</tr>
<tr>
<td>1941</td>
<td>28,129,000</td>
</tr>
<tr>
<td>1942</td>
<td>30,123,000</td>
</tr>
<tr>
<td>1943</td>
<td>35,495,000</td>
</tr>
<tr>
<td>1944</td>
<td>34,987,000</td>
</tr>
<tr>
<td>1945</td>
<td>35,495,000</td>
</tr>
<tr>
<td>1946</td>
<td>39,644,000</td>
</tr>
<tr>
<td>1947</td>
<td>41,623,000</td>
</tr>
<tr>
<td>1948</td>
<td>46,272,000</td>
</tr>
<tr>
<td>1949</td>
<td>56,620,000</td>
</tr>
<tr>
<td>1950</td>
<td>59,648,000</td>
</tr>
<tr>
<td><em>1951</em></td>
<td>65,675,000</td>
</tr>
</tbody>
</table>

*(estimated)*

The following breakdown of the four major products consumed by Mexico shows the main uses to which domestic consumption has been put in the year of expropriation, and the significant change which occurred twelve years later:

### TABLE XII

**BREAKDOWN OF FOUR MAJOR PRODUCTS CONSUMED BY MEXICO**

<table>
<thead>
<tr>
<th>Year</th>
<th>Motor fuel</th>
<th>Kerosine</th>
<th>Lubricating oil</th>
<th>Residual fuel oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>1938</td>
<td>3,000,000</td>
<td>800,000</td>
<td>200,000</td>
<td>12,600,000</td>
</tr>
<tr>
<td>1950</td>
<td>14,925,000</td>
<td>4,500,000</td>
<td>600,000</td>
<td>26,500,000</td>
</tr>
</tbody>
</table>

Pemex had to pool all its resources to keep up with the increasing demand for refined products. Despite serious technological and equipment difficulties Pemex has done a
remarkable job in supplying these domestic needs. In 1942, with United States help, the refineries began to produce more and more products. The progress made by Pemex since 1942 can be seen in the following table:

**TABLE XIII**

**COMPARISON OF PEMEX REFINERY PRODUCTION IN 1942 AND 1950**

<table>
<thead>
<tr>
<th>Year</th>
<th>Motor fuel (barrels)</th>
<th>Kerosine (barrels)</th>
<th>Lubricating oil (barrels)</th>
<th>Residual fuel oil (barrels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1942</td>
<td>6,786,000</td>
<td>802,107</td>
<td>255,000</td>
<td>22,586,000</td>
</tr>
<tr>
<td>1950</td>
<td>11,843,000</td>
<td>4,489,000</td>
<td>233,000</td>
<td>30,362,000</td>
</tr>
</tbody>
</table>

The only decline has been in lubricating oil. As equipment for refining lubricants wore out, Pemex relied more and more on the imports of refined lubricants. Refining lubricants is a highly complex process requiring a considerable amount of capital and technical skill and equipment. Because of the stress by Pemex on other phases of the petroleum problem, the refining of lubricants therefore suffered a decline.

Before going into the export and import problems of Pemex, mention should be made of the new development of natural gas in Mexico.

**Mexico Utilizes Natural Gas**

Mexico has a considerable amount of natural gas. Until recent times most of the natural gas has gone to waste because the Pemex plants did not have the facilities to handle
it. The first successful exploitation of natural gas came at the end of World War II when Pemex was able to acquire pipe lines and equipment. The largest natural gas plant was at the Poza Rica field. It had a capacity of 30,000,000 cubic feet daily. Due to the lack of facilities to handle more and to the absence of a close market 20,000,000 cubic feet of wet gas were being wasted daily.

Later Pemex was able to get additional equipment to enlarge the Poza Rica plant. A new high-pressure gas line was constructed from Poza Rica to Mexico City to facilitate the use of this natural gas. This pipe line has a capacity of 50,000,000 cubic feet daily. The completion of the plant at Poza Rica and the pipe line to Mexico City has been an important factor in the recent industrial development in Mexico City.

Another significant aspect of this pipe line is that the natural gas which had heretofore gone to waste was now serving a useful function. A number of petroleum products that had been previously sent to Mexico City at a high cost could now be diverted to other areas in Mexico or exported.

At the end of World War II Pemex began explorations for natural gas pools in northeastern Mexico. Up to this time large quantities of natural gas were imported from the United States. About 50,000,000 cubic feet of gas was imported daily from Texas. Most of this gas was consumed in
the Monterrey district. Pemex hurried explorations in areas south of the border because the dollars expended for the United States gas were a considerable burden on Mexico's balance of payment situation.

In 1948 a plant for the utilization and distribution of natural gas was completed in northern Tamaulipas. The important gas wells in this state are at the cities of Camargo, Brasil, Mision, and Reynosa. As soon as Pemex was able to get pipelines these fields took over the areas previously supplied from the United States. These gas fields have been an important factor in the recent industrial expansion of the Monterrey area.

Exports of Petroleum Products

In terms of Mexico's ability to develop new industries and raise the standard of living, Mexico has had to rely to a large extent on the exports of minerals. Of all the extractive industries, petroleum has had the most profound effect on the national economy. From the development of the oil fields in 1900 to the expropriation, the tax on exports of petroleum provided one of the chief sources of income for the Mexican treasury. The effects on the national economy of the expropriation has already been dealt with. Suffice it to say that in this respect, even today the effects of the expropriation are still evident.

The peak of Mexican exports were reached in 1922 when
180,600,000 barrels were exported. In 1937, the last year of foreign oil company operations, exports had declined to 24,560,000 barrels. The following factors led to a gradual decline of exports from 1922 to 1937: 1) the development of new oil fields in other countries; 2) the decline of Mexican production; and 3) the beginning of a steady rise in domestic consumption. In 1938 exports fell to 8,564,000 barrels as compared to the 24,560,000 barrels in 1937, largely because of the boycott by the expropriated oil companies.

The final settlement with the United States, Britain and the Netherlands led to the re-entry of Mexico into the world market. Mexico however, then found herself unable to export petroleum on the pre-expropriation level for reasons already mentioned. It was not until the end of World War II that Pemex was able to export a significant quantity of petroleum. In 1947 Pemex exported 14,508,000 barrels of petroleum and petroleum products. Of this total, the United States imported 69 per cent. Other important markets in that year were Cuba, 12 per cent, France 4.5 per cent, West Indies, 4.3 per cent, Canada, 2.6 per cent, Netherlands 2.6 per cent, and Belgium, 2.5 per cent. As a result of new drilling activity, Pemex was able to export 23,308,000 barrels in 1950, the highest amount since the government took over the petroleum industry. (See TABLE XIV, EXPORTS OF CRUDE AND REFINED PETROLEUM SINCE 1938)
The urge for exporting petroleum comes from the realization that Pemex must export as much petroleum as possible to earn foreign exchange for the purchase of equipment and material needed for development and expansion. Pemex announced recently that it was seeking new markets abroad. One of the results of this action was an agreement by which Argentina would soon start importing petroleum products from Mexico. Negotions are now under way for an agreement with Brazil.85

**Imports of Petroleum Products**

The imports of petroleum products have increased steadily since the end of World War II. The following table gives the imports of refined petroleum since 1938:
TABLE XV

IMPORTS OF REFINED PETROLEUM PRODUCTS SINCE 1938

(barrels)

<table>
<thead>
<tr>
<th>Year</th>
<th>Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>1937</td>
<td>2,348,000</td>
</tr>
<tr>
<td>1938</td>
<td>1,670,000</td>
</tr>
<tr>
<td>1939</td>
<td>1,382,000</td>
</tr>
<tr>
<td>1940</td>
<td>2,162,000</td>
</tr>
<tr>
<td>1941</td>
<td>2,148,000</td>
</tr>
<tr>
<td>1942</td>
<td>2,572,000</td>
</tr>
<tr>
<td>1943</td>
<td>1,856,000</td>
</tr>
<tr>
<td>1944</td>
<td>2,068,000</td>
</tr>
<tr>
<td>1945</td>
<td>2,429,000</td>
</tr>
<tr>
<td>1946</td>
<td>3,380,000</td>
</tr>
<tr>
<td>1947</td>
<td>4,641,000</td>
</tr>
<tr>
<td>1948</td>
<td>4,685,000</td>
</tr>
<tr>
<td>1949</td>
<td>5,578,000</td>
</tr>
<tr>
<td>1950</td>
<td>7,450,000</td>
</tr>
</tbody>
</table>

This dependency of Mexico on petroleum imports poses the most difficult problem that Pemex faces today. The following statement in a United States Congressional report gives a good example of the problems Pemex must solve:

Although Mexico exported 10,101,000 barrels of crude to the United States in 1947 and imported only 4,641,000 barrels, Mexico expended some $3,700,000 more in those purchases than it received from sales in the United States. The reason is the higher prices of the products imported, which are more highly refined items than those exported. While Mexico's exports to other countries more than made up for the difference and resulted in a total export balance on petroleum amounting to $4,000,000, the nature of Mexico's terms of trade in petroleum is of great significance as related to the country's balance of payments problem.

Pemex under Bermudez has made great progress in the past six years. With the present troubles in Iran and the increasing world demand, the future of Pemex's exports seems...
assured. The two problems Pemex must solve are: 1) the development of new sources of petroleum for domestic consumption and exports; and 2) the development of new refineries to lessen dependency of Pemex on the imports of expensive refined products.
CHAPTER VI

CURRENT STATE OF EQUIPMENT AND TECHNOLOGICAL DEVELOPMENT

The extraction, refining and distribution of petroleum is a complicated business and, as we have seen, Mexico did not have competent administrators, technical experts and the necessary equipment to operate the oil agency efficiently when it nationalized the petroleum industry. The progress Pemex has made in recent times has depended to a large extent on its ability to procure equipment and technical advice from the United States.

The few native administrators and technicians Mexico had in 1938 were relegated to minor positions in the Pemex agency, because of its preference for men with political influence. There were cases of Pemex converting junior assistants into superintendents and graduates fresh out of engineering school were put in charge of technical operations, but these men were not only inexperienced, but also subject to conflicting orders from the political and union-led Pemex oligarchy.

Although the foreign oil companies had left a gigantic system of pipe lines, refineries, transportation lines, distribution stations, tank farms and terminals, the Pemex agency faced a terrific transportation problem. As we have seen, the whole transportation system established by the
foreign oil companies was geared for exports. The petroleum fields and refineries were situated on the east coast low-lands while the main areas of domestic consumption were in the central highlands. The inefficiency of Mexico's railroads and motor transportation system often led to scarcities in these highland areas.

Mexico, as an underdeveloped area, was not able to produce the essential machinery and equipment needed for efficient petroleum operations. Pemex had to depend solely on the imports of these articles. Since the settlement of the controversy over the expropriated properties, Pemex has been able to get more and more tankers, machinery, tank cars, pipe lines, etc. With the return of essential petroleum equipment, Pemex has been able to progress rapidly in the oil business.

**Technical Skills**

We have already seen the effect of political and union influence on Pemex up to the beginning of the Aleman regime. It was not until Bermúdez and President Aleman re-organized the Pemex agency and rid it of political lame ducks and put efficient personnel in their place, that Pemex began to show progress. United States technicians were sent to Mexico during and after World War II to help Pemex solve its producing and refining problems. The technological progress Pemex has made today is to a considerable extent a
result of this United States help. Efficient personnel are still badly needed by Pemex and one of the major parts of Bermudez's development plans is the training of Mexican nationals in oil know-how.

Although we will presently discuss the return of American capital in the oil industry, mention should be made that one of the conditions demanded by major oil companies, if they are to return to Mexico, is that they retain control of the oil fields they discover so that they can regulate production. These American companies claimed that Pemex technicians pumped the wells too fast, thus wasting 30 per cent of the fields' potential output. Before spending capital and using scarce materials in Mexico these American companies wanted assurances of maximum output. This example is given to show that although Pemex has made some technological progress it is a long way from being efficient.

The Mexican petroleum industry is in its infancy when we compare it to other major producing countries. Mexico must train more and more personnel not only for extracting and refining petroleum but also in the use of petroleum by-products. The United States has produced sixteen derivatives from salvaged and converted waste petroleum. Mexico not only lacks equipment for such development but also specifically trained engineers and technical personnel.
Bermúdez is surrounded by men who have dedicated their professional careers to the advancement of Pemex. Pemex has been more fortunate in securing more good men on the top level than on the operating level. Since 1946 Pemex has trained many engineers and technicians but they are small in number when one considers the present scope of Pemex's operations.

**Transportation Difficulties**

Mexico's mountainous terrain has been one of the most important obstacles in Pemex's ability to supply her home market. For example, Pemex in 1950 was able to refine 75 percent of domestic requirements for non-aviation gasoline and kerosene. At the same time, the major difficulty in supplying Mexico's west coast region was not so much a lack of domestic gasoline and kerosene, but the problem of transportation over the rugged Sierra Madre Occidental. As a result, the west coast at times suffered serious shortages of fuel oil and had to rely on imports from California.

To relieve this serious situation Pemex has just completed (July, 1951) a pipe line which crosses the Isthmus of Tehuantepec from Minatitlán on the Gulf of Mexico to the Pacific port of Salina Cruz in the state of Oaxaca. It is the first interoceanic pipeline in the world. This pipeline helps Pemex in two ways: 1) it lessens the dependency on high priced American petroleum products; and 2) assures
the west coast regions of a steady supply of petroleum products.

Pemex has suffered from operating in a country where high mountain ranges, lack of surfaced roads and an obsolete railroad system make internal distribution difficult. Bermudez realized that Pemex had to rely on the use of pipe lines to supply the home market. Although a complete network of pipe lines was left by the foreign oil companies these were poorly located. Most of the pipe lines and machinery left the the foreign oil companies had been idle during the early years of Pemex operations. Because of the lowland climate this material rapidly deteriorated. The only way Pemex could assure the areas of consumption a constant supply of petroleum was to build refineries in those areas and pipe lines from the oil fields to the refineries.

**Equipment Needed**

Along with increasing exploration activities and upping refining capacity, Bermudez has begun the job of crisscrossing Mexico with pipe lines to overcome distribution problems. In 1946 Pemex imported 5,062 net tons of pipe lines from the United States. From January to October of the following year Pemex imported 21,615 net tons. This increase of pipe lines during Bermudez's first year as director of Pemex, shows the seriousness of his plans to
rely mainly on pipe lines rather than motor transportation or Mexico's railroads. In the last five years Pemex has laid out over one thousand miles of new pipe lines which are much more important to Mexico than the nine hundred or so miles that were left by the foreign oil companies.

In the past few years with more and more crude petroleum available for exports, Mexico's tanker fleet is becoming important. As we have seen, the lack of a tanker fleet in 1938 was one of the major reasons for the decline in the exports of Mexican petroleum. At the time of nationalization Pemex had a few coastline vessels and one tanker available for navigation on the high seas. With the seizure of twelve Axis ships in Mexican harbors, in December, 1941, the total tonnage of Pemex's fleet rose from 17,542 gross tons in 1938 to 93,966 gross tons when Mexico took over the Axis ships.

In 1950, to aid its increasing export trade, Pemex bought six new tankers, five from the United States and one from Spain. Today the Pemex flag waves on no less than 219 vessels of all kinds, including, according to the *Mexican American Review*, "nineteen tankers and converted freighters, and thirteen sea going tugs." Bermúdez reported that Pemex ships travelled 196,350 sea miles, carried 24,000,000 barrels of oil and gasoline, and 150,000 metric tons of general cargo in 1950.92
The increase of tank cars and tank trucks during President Aleman's administration has also been helpful, and has resulted in less periods of shortages in areas distant from the pipe lines. The railroad and motor transportation system of Mexico are far from perfect but plans are under way for the development of new highways and increased efficiency of the railroad system.

Exploration Equipment

Of all the equipment shortages the Pemex agency has faced, the most serious one, in the long run, is the lack of exploration material. During the troubled years before 1938, the foreign oil concerns had ceased all exploration activities. All servicable drilling machinery was shipped out and only obsolete equipment was left behind in 1938. When Pemex took over the oil industry all it could show in the way of development equipment was forty dilapidated drilling rigs and sundry equipment, left by the foreign oil companies. Some of this equipment could have been made serviceable but the Pemex organization, in desperate need of cash, had shipped as much of the movable equipment as possible to Japan as scrap.

As we have seen, up to World War II very little exploration for new fields took place. The need for an exploration program became apparent when President Aleman reorganized Pemex at the end of 1946. Up to this time Pemex
had secured fifty drilling rigs, most of them coming from the United States during the war period. With the stepped up exploration program under Bermúdez, Pemex now has 117 drilling rigs. The progress made by Pemex since 1946 in securing drilling equipment is remarkable when one considers the high cost and scarcity of this type of material.

Although Pemex's drilling activity has increased in the last five years, Mexico is a long way from exploring her petroleum resources. The United States in 1950 drilled 43,000 wells of which more than 20,000 were dry. With her limited amount of drilling equipment, Pemex was able to drill three hundred wells in 1950, of which ninety were dry.

A good deal of equipment has been imported during the past five years but much more is needed if Pemex is to keep up its present rate of production. In January, 1951, Pemex was advised to order machinery and equipment needed for future development because of the possibilities of shortages due to the United States rearmament program.

The present world troubles threaten to slow down Pemex's development program. To ease the possibilities of shortages if a third world war follows, Mexico has made plans to increase domestic steel production for the manufacturing of pipe lines and other petroleum equipment. The steel mills of Altos Hornos at Monclavia, in the state of Coahuila, and the Fundidoro de Fierro y Acero in the state
of San Luis Potosí are scheduled to expand their facilities to meet the needs of Pemex.

The present order of Pemex for a $600,000 dollar Cardwell drilling rig and 23,500 tons of sixteen inch pipeline from the United States Kaiser Steel Company has been promised immediate delivery but beyond this order Pemex will not be assured any appreciable amount of equipment with present world conditions as they are.94
CHAPTER VII

RETURN OF FOREIGN CAPITAL

As soon as President Miguel Aleman took office in December, 1946, it became apparent that he was going to take drastic measures to increase the efficiency of Pemex. As we have seen he attacked the problem in two ways: 1) he appointed Bermudez to reorganize Pemex; and 2) he made it known that the Mexican petroleum industry would not be adverse to the re-entry of foreign oil companies for exploration and development, with certain limitations.

Bermudez was thus given the go-ahead signal by President Aleman to negotiate with foreign oil companies. Bermudez realized that the Pemex lack of capital and its inability to take the risks involved in exploring and developing new areas for petroleum, was one of the agency's fundamental weakness. Hence, he attempted to have this work financed by foreign contractors under a percentage-of-production arrangement.

In dealing with the return of foreign capital to the Mexican petroleum industry, it is necessary to understand: 1) the present petroleum laws in Mexico; 2) the terms under which foreign capital can re-enter Mexico; 3) the response of foreign oil companies to the new terms; and 4) the popular Mexican attitude toward the re-entry of foreign
We have already discussed article 27 of the 1917 Mexican Constitution which provided the legal authority by which Mexico expelled the foreign oil companies in 1938. It will be remembered that article 27 stated that all subsoil rights shall be vested in the nation, including such rights as direct ownership of minerals, metals, precious stones, petroleum, all solid, liquid, or gaseous hydrocarbons, salt and solid mineral fuel. In all the minerals cited above, the ownership of the Mexican nation is inalienable and imprescriptible and concessions may be granted only by the Federal government to private individuals or to civil or commercial corporations organized in accordance with Mexican law.95

After the foreign oil companies were expelled in 1938 article 27 was reinterpreted by President Lázaro Cárdenas, on December 27, 1939, so as to provide that, "in the case of petroleum, or solid, liquid, or gaseous hydrocarbons, no concessions could be granted and that special laws should govern the exploitation of such products."96 Three days after President Cárdenas presented this formulation, it was made into law by the Mexican Congress and was called the Mexican Petroleum Law of 1939.

On May 2, 1941 a new petroleum law was pushed through by President Ávila Camacho, which varied slightly from the
petroleum law of 1939. This petroleum law of 1941 is still in effect today so that a detailed description of the law is essential if we are to understand the legal bases for the re-entry of foreign oil companies to Mexico.

The important articles in the present petroleum law of Mexico are as follows:

**Article 1**: reaffirms the principle laid down in article 27 of the constitution of the nation's inalienable and imprescriptible rights of all subsoil minerals.

**Article 2**: the petroleum industry is subject exclusively to Federal jurisdiction.

**Article 4**: the petroleum industry was declared a public utility and it had preference over other uses of the soil. Provided adequate compensation was given, the Federal government could expropriate land for petroleum exploitation.

**Article 5**: the petroleum industry consists of exploration, exploitation, transportation, storage, refining, and distribution of petroleum.

**Article 6**: exploration and exploitation could be carried out in the following ways:

a) by direct government operation.

b) through a public petroleum institution.

c) through contracts with private individuals or corporations.

**Article 10**: this article places the following restrictions
on section 3 of article 6. The contracts must be made with:

a) Mexican nationals.

b) companies entirely composed of Mexicans.

c) mixed companies in which the Federal government holds a majority of the capital stock.

Under this petroleum law of 1941, the Mexican government cannot enter into contracts with foreign oil companies or Mexican subsidiaries of foreign oil companies. Since this law was passed in 1941, the Mexican government has not even entered into any contracts with Mexican nationals or companies owned by nationals. All exploration and exploitation activities in Mexico since 1941 have been carried out by the public petroleum institute, Pemex, as provided for by article 6, section 2, of the 1941 petroleum law.

This petroleum law placed several restrictions on the public petroleum institute, Pemex. They are as follows:

Article 19: prohibits Pemex from transferring to a third party, rights or obligations given to it.

Article 47: states that before Pemex can enter into any contract with either domestic or foreign oil companies it must have prior authorization of the Department of Economics. All companies given contracts are under the strict supervision of Pemex.

It was under article 47 that Pemex found the legal
loophole to allow foreign oil companies to re-enter Mexico. This provision is interpreted by Pemex as authorizing it to enter into contracts with foreign oil companies since article 10 does not apply to contracts made by Pemex under article 47 of the petroleum regulations.

The legality of Pemex's new contracts has not as yet been confirmed by law or in court decisions. The question is:

Can Pemex under article 47 legally enter into long-term contracts which entitle foreign companies to a percentage of oil produced from wells drilled by them, and which give the companies a degree of managerial control sufficient to protect their investment in their exploration and exploitation ventures, or do such contracts go beyond the limits of what is contemplated by that provision of the petroleum regulations and violate articles 6 and 10 of the petroleum law and article 19 of the petroleum regulations?

The very fact that there is some doubt of the legality of contracts made with Pemex has proved to be one of the stumbling blocks in Bermúdez's attempts to attract foreign capital to Mexico. Some major oil companies, primarily American, are still holding back from entering Mexico because of the fear that a future Mexican administration might invalidate the contracts negotiated by Pemex.

New Terms for Re-Entry into the Mexican Petroleum Industry

Bermúdez issued the following terms under which private foreign oil companies could resume petroleum operations in Mexico:
1) The private oil companies would be agents for Pemex and could operate only in areas designated by Pemex. These companies would undertake geological and geophysical exploration and development drilling.

2) If petroleum was discovered the private oil companies could act as agents for Pemex or allow Pemex to run the fields for them. 100

3) If petroleum was discovered the foreign oil concerns would receive:
   
   a) 50 per cent of gross production until their initial investment was repaid, plus:
   
   b) 15 per cent of production from wells drilled on land, and/or:

   c) 18 per cent of production in tideland areas.

   d) When the initial cost or investment was recovered by the foreign oil companies they would continue to receive 15 per cent of production from the wells drilled on land and/or 18 per cent in tideland areas. 101

4) Contracts are limited to a maximum of thirty years for exploitation and three years for exploration, after which all permanent installations become the property of the Mexican government. 102

5) No payments were to be made, however, if the foreign oil companies failed to discover petroleum.
Among several foreign oil companies interested in returning to Mexico, this last stipulation, that they would have to bear the entire loss if no oil was found, proved to be the deciding factor in preventing them from coming to terms with Pemex.

Although Bermúdez has made a few other arrangements in attracting foreign capital, these were special cases. We will deal with those contracts presently. Outside of the special arrangements, the foreign oil companies presently operating in Mexico have all signed contracts agreeing to the terms stipulated above by Pemex.

**Special Pemex Contracts for Petroleum Development**

Bermúdez in 1947 knew he had to move cautiously in bringing back foreign oil companies to Mexico because such actions might cause serious political problems for the administration. The first negotiations then were with independent oil men who were not involved in the expropriation.

The first contract to be signed with a foreign concern came in September, 1947 when Bermúdez came to terms with Edward Jones, a minor United States oil promoter. Jones was a dealer in oil royalties and he was contracted to drill one hundred wells. Jones was to furnish machinery, workers, and pay all the bills. In return the Mexican government would reimburse Jones in Mexican government bonds for all expenses plus 10 per cent. This first
adventure by a foreign oil concern was a failure. Actually only one old drilling rig was sent to Mexico by Jones. The results of this drilling activity by Jones was one well completed and it turned out to be dry. Meanwhile Bermúdez had started negotiations for three other "Jones type" contracts with United States oil men but none of these negotiations materialized.103

The first important contract by Pemex came in April, 1948, when a contract was signed between the petroleum agency and Cities Service Company. This contract, however, was a special case because this company, through a Mexican subsidiary, still had control of lands in northeastern Mexico. The terms of this new contract were that Cities Service would loan Pemex capital for exploration or development; in return Pemex would earmark a portion of any boost in production for the American company at below market prices. Cities Service would lend Pemex 1,000,000 dollars annually for ten years at 3 per cent interest. This money was to be used for exploring some 1,000,000 virgin acres in northeastern Mexico. Although this contract seems to favor Pemex, the American company had two hedges: 1) nearby wells were known to be productive; and 2) Cities Service could withdraw from the contract whenever it was dissatisfied with operations.104

The signing of this contract broke the tension in
Mexico over the return of foreign capital. This act did not cause any serious political problems. Bermudez now felt he could start negotiations with major oil companies and not run the risk of a political upheaval.

In June, 1948, a few months after the Cities Service contract was signed, it was reported that fifteen American oil companies had turned down contracts with Pemex, on the grounds that the terms offered involved too much risk. Negotiations were going on all the time as both sides attempted to reach an agreement. The American oil companies were not adverse to operating in Mexico because of the limited areas available in the United States for explorations. Pemex, on the other hand, needed the American oil companies exploration know-how to insure future petroleum production.

The Mexican American Independent Company (C.I.M.A.)

The first contract undertaken by a foreign oil company, under the terms of article 47 of the 1941 petroleum law, was signed in March, 1949, just eleven years after the expropriation. A group of independent American oil operators signed a contract with Pemex to undertake geological and geophysical exploration and development drilling. The operators were the American Independent Oil Company, Signal Oil and Gas Company, and Edwin W. Pauley. Each of these groups held 33 1/3 per cent ownership in their operating
company known as The Mexican American Independent Company, (Compañía Independiente Mexicana - Americana or C.I.M.A.)

C.I.M.A. began active operations on the Gulf coast side of the Isthmus of Tehuantepec in southeastern Mexico. This area includes both uplands and submerged lands. Drilling activity was started at two places: 1) at Tortuguero, about nineteen miles east of Puerto Mexico in the state of Vera Cruz; and 2) at Xicalango, near the town of Ciudad del Carmen in the state of Campeche.

The Mexican American Independent Company's first operations proved very costly. Only five wells were completed, costing C.I.M.A. some 3,000,000 dollars. Of these five wells, two were nonproductive; two consisted of gas, which was useless because of their location in the southern Mexican jungles; and one well that was brought in was only able to produce two hundred barrels a day.

This initial setback of C.I.M.A.'s operations turned out to be so costly and unproductive that Signal Oil and Gas Company sold its holdings to Petrofina, a Belgian Oil company. Edwin W. Pauly also sold part of his share to the American Independent Oil Company. Thus C.I.M.A., at the start of its second and more successful explorations, now consisted of: 1) American Independent Oil Company, 53 1/3 per cent; 2) Petrofina, 33 1/3 per cent; and 3) Edwin W. Pauley, 13 1/3 per cent.
Under the direction of Petrofina and its financial backing, the operation is proving to be the most successful of any foreign company now in Mexico. In April, 1951, C.I.M.A. discovered a new petroleum field in the Tortuguero area of Vera Cruz. This area is called the Rabón Grande Oil Field. Executives of C.I.M.A. have given the estimate reserves of this field at 50,000,000 barrels. George Calleya, the general manager of C.I.M.A., said that the splendid co-operation by Pemex has been the most important factor in their successful operation. 108

The outstanding feature of developing this new field was the small amount of capital needed to complete each well. It has cost the reorganized C.I.M.A. company 50,000 dollars to bring in each well, which is a sharp contrast to the 1,000,000 dollar holes sunk by C.I.M.A. in 1950. 109

In July, 1951, the Rabón Grande field was producing 221 barrels a day and as soon as export facilities are made available, the production of this field will be stepped up. After suffering its initial loss, C.I.M.A. is optimistic for the future.

Response of Other Foreign Oil Companies

Negotiations were started early in 1950 between Bermúdez and the Compagnie Francaise des Petroles. This company wanted a percentage-of-production contract like the one given to C.I.M.A. The French company offered to invest
200,000,000 dollars on the condition that it be allowed to

take its share of oil production back to France's refineries.

Bermudez refused to allow the petroleum to be exported. He
claimed that Pemex needs the petroleum for its domestic
market. Pemex wanted to pay the French company its percent-
age of petroleum in cash.

As yet, no final arrangements have been made. Of any
pending deal between Pemex and the French company Bermudez
said: "If they want to sign a contract to work in Mexico
they'll have to accept Pemex's terms." 110

In May, 1951, Southeastern Oil Company of Jacksonville,
Florida announced that it was going to sign an oil drilling
contract with Pemex. As yet no agreement has been reached.
Southeastern Oil Company plans to drill 150 new wells.

The other United States oil companies working on a
percentage-of-production contract with Pemex are relatively
small. They include: 1) Sharmex, (The Sharpless Oil
Company of Denver, Colorado) which has drilled two wells,
both dry holes; and The Isthmus Oil Company of Texas which
has yet to drill its first well but hopes to drill ten new
wells and rehabilitate ten old ones. 111

In September, 1951, Pemex and United States Sinclair
Oil Company officials met. Although no contract has been
signed, the two companies did reach a settlement of Sinclair's
claims against Pemex for the value of property expropriated
in 1938 from the Charm Oil Company, a one-time Sinclair subsidiary. The settlement of this dispute opens the door for the return of Sinclair to Mexico. If Sinclair does renew operations in Mexico, it will be the first major company affected by the expropriation to return to Mexico.\textsuperscript{112}

In terms of increasing the production of crude petroleum, the return of foreign capital has not yet affected the Mexican petroleum industry appreciably. What is of importance in the return of foreign capital has been its exploration activities. Most of the present fields operated by Pemex have passed their peak production level. The hope of Mexico's future petroleum development depends on the fields developed by the returning foreign oil companies.

**Mexican Attitude Toward New Foreign Capital in the Petroleum Industry**

The Mexican people have not forgotten the advantages the foreign oil companies had during the Porfirio Díaz regime. Since the expropriation, the nationalized petroleum industry has been most sensitive to this public reaction against foreign influence. Pemex has had to move slowly and cater to public opinion.

Although the petroleum industry was nationalized in 1938, the other extractive industries in Mexico were not seriously affected by the public's reaction against foreign control. The different treatment accorded to one extractive
industry among several, may be explained by one of the following reasons, or a combination of them.

1) The psychological aspect of seeing millions of barrels of petroleum exported with little or no visible benefits going to the Mexican people.

2) The other extractive industries had put more of their profits back into Mexico either by expanding their plants or improving conditions of the workers.

3) The tremendous tracts of land virtually given away by Díaz to the petroleum companies, in a land-hungry country like Mexico.

As was to be expected the leaders in the protests against the return of foreign capital to the petroleum industry were the trade unions. Mexico's leading trade union federation, C.T.M., which included the oil workers syndicate, under its chief spokesman during the Lázaro Cárdenas and Ávila Camacho regimes, Vincente Lombardo Toledano, warned that it would oppose any return of foreign capital to the petroleum industry. Lombardo Toledano held that any development by foreign oil companies would weaken national ownership and operations in the petroleum industry.113

Bermúdez expected this opposition but the liberal terms received by Pemex in its new contracts have temporarily toned down labor's opposition. Bermúdez points out that the contracts made by Pemex are much more favorable to
Mexico than those given to any underdeveloped area in the world. 114

Although the major foreign oil companies have not rushed to accept the terms offered by Pemex, Bermudez feels that at the rate of present world production and consumption, the foreign oil companies will in time come to Mexico at Pemex's terms. He feels it is a wiser policy to keep the oil in the ground rather than let too great a proportion of the oil profits go to foreigners. On the other hand, Bermudez realizes the need of new explorations if Mexico is to prosper in the oil business.
CHAPTER VIII

PETROLEUM FIELDS, RESERVES AND EXPLORATIONS

Mexico's oil future depends on finding new fields which are believed to underlie the country's vast sedimentary basin. These fields must be discovered to ease the burden on the present overworked fields. One of the serious shortcomings of Pemex has been its failure to develop new reserves as rapidly as old reserves were depleted. Next to areas in the Middle East and Brazil, Mexico is thought to have some of the world's largest and promising unexplored areas, which may hold 10,000,000,000 barrels of undiscovered oil.115

Since the first explorations of oil in 1900, a little over seven-thousand wells have been drilled in Mexico. The United States in one year alone, 1950, drilled 43,000 wells. Mexico in 1950 drilled 217 wells. The significant factor here is that Mexico is a relatively unexplored area when we compare it to the United States.

The progress made by Pemex in drilling activity, nevertheless, has been notable in the past four years. In 1946 Pemex completed forty-nine wells as compared to the 217 wells in 1950. The significance of this development can be seen when in January 1, 1946 the estimated proven reserves were 870,000,000 barrels as compared to the 1,300,000,000...
barrels in January 1, 1950. With the recent discovery of new petroleum fields by Pemex geologists in the states of Vera Cruz, Tampaulipas, and Tabasco, the estimates of Mexican proven reserves have risen to 1,400,000,000 as of September, 1951.116

**Petroleum Reserves**

There are two major oil producing basins in the world. They are 1) the Mediterranean and Middle East basin; and 2) the basin which lies between North America and South America, including the Caribbean Sea and the Gulf of Mexico. Almost all of the world's oil has come from either of these two areas. In this second area or basin are located the oil deposits of the United States, Venezuela, Mexico and Colombia.117 This great basin ranks second among the petroleum provinces of the earth both in proved reserves and in promise for future discoveries.118

Of the four major oil producers in this basin, Mexico ranks third to the United States and Venezuela in proven reserves. The following table gives the estimated reserves of the major petroleum producing countries in this basin:
### TABLE XVI

**ESTIMATED PETROLEUM RESERVES OF THE FOUR LEADING PETROLEUM PRODUCING COUNTRIES IN THE WESTERN HEMISPHERE**

As of January 1, 1951

<table>
<thead>
<tr>
<th>Country</th>
<th>Estimated proven reserves (barrels)</th>
<th>Percent of world</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>26,217,724,000</td>
<td>27.54</td>
</tr>
<tr>
<td>Venezuela</td>
<td>9,500,000,000</td>
<td>9.98</td>
</tr>
<tr>
<td>Mexico</td>
<td>1,400,000,000</td>
<td>1.37</td>
</tr>
<tr>
<td>Colombia</td>
<td>375,000,000</td>
<td>0.39</td>
</tr>
</tbody>
</table>

The possibilities of developing new oil fields in Mexico are great but technical problems have to be overcome before an accurate estimate of Mexican reserves are known. Oil technicians have stated that there is a considerable quantity of petroleum in the shallow-water areas off the Gulf coast of Mexico. These areas extend from the fields already developed in the Tampico basin and Isthmus area. These oil pools are said to extend from thirty to two hundred miles offshore. If the technical problems of operating in waters down to six hundred foot depths or even to three hundred feet, can be solved these areas will increase Mexico's petroleum proven reserves considerably.121

Another important area which is still relatively unexplored is the Rio Grande Tertiary basin. This area includes the states of Tamaulipas, Nuevo León, Coahuila, and Chihuahua. Geologists consider this area a part or a continuation of the United States Gulf Coast embayment. Actual exploratory and development work has begun in this area but...
it has been entirely limited to the state of Tamaulipas. One of the main factors in the increase of estimated proven reserves has been the development of these fields in north-eastern Mexico.122

Before we go into a discussion of the new oil fields developed by Pemex, thus adding to Mexico's proven reserves, a description of Pemex's drilling activity since nationalization would be appropriate.

**Petroleum Exploration**

We have already seen how President Miguel Aleman and Senator Antonio Bermudez placed a great emphasis on extending Pemex's exploration program. The results of this emphasis on exploration can be seen in the following table:

**TABLE XVII**

<table>
<thead>
<tr>
<th>WELL COMPLETED FROM 1946 TO 1950 AND RESULTS 123</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>1946</td>
</tr>
<tr>
<td>1947</td>
</tr>
<tr>
<td>1948</td>
</tr>
<tr>
<td>1949</td>
</tr>
<tr>
<td>1950</td>
</tr>
</tbody>
</table>

The 217 wells drilled in 1950 represented the largest amount of wells drilled in any one year since 1928. This was a remarkable achievement considering the many obstacles Pemex had to overcome. It was recently announced in the Mexican American Review that from September, 1950, to September, 1951, Pemex completed 267 wells, of which 145 were productive
with a potential yield of 62,000 barrels of crude daily plus 2,100,000 cubic meters of gas.  

Pemex in 1950 had a total of 1,215 producing oil wells. The following table shows Mexico's place in the world's total of producing wells. Also given is the daily average production of each well:

<table>
<thead>
<tr>
<th>Country</th>
<th>Producing oil wells</th>
<th>(barrels) Daily Average production per well</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>467,776</td>
<td>12.1</td>
</tr>
<tr>
<td>Venezuela</td>
<td>6,915</td>
<td>238.6</td>
</tr>
<tr>
<td>Mexico</td>
<td>1,215</td>
<td>173.8</td>
</tr>
<tr>
<td>Peru</td>
<td>3,698</td>
<td>11.1</td>
</tr>
<tr>
<td>Canada</td>
<td>3,469</td>
<td>24.1</td>
</tr>
<tr>
<td>Middle East</td>
<td>343</td>
<td>5,750.0</td>
</tr>
</tbody>
</table>

Mexico had about one thousand producing wells in 1934 and the daily average production per well then was 2350 barrels. The drop from 2350 barrels a day per well to 173.8 per day certainly shows the extent of the depletion of her existing wells. It will be recalled that most of the production achieved by Pemex since 1938 has come from these wells located on the fields developed by the foreign oil companies.

**New Oil and Gas Fields in Mexico**

No significant new oil fields were discovered in Mexico until 1948 when the northeastern fields in the state of Tamaulipas were developed. Other areas developed since
1948 are located in the states of Vera Cruz, Tabasco and Campeche.

**Tamaulipas**

The main exploration activities of Pemex in northeastern Mexico have taken place in the state of Tamaulipas. It was here that the first important new area was developed by Pemex. The state of Tamaulipas is at present the only major oil and gas producing state in the northeastern region of Mexico. The fields in this area are as follows:

**Reynosa Field.** This field was discovered in February, 1948 and by April, 1951, had twelve oil wells and fourteen gas and distillate wells. Production from the Reynosa field is about 1600 barrels of oil, 1500 barrels of distillate and 72,000,000 cubic feet of gas daily. Pemex at first held high hopes that this field would be a major discovery but extended drilling in this field has not resulted in any appreciable increase of crude oil. 

**Francisco Cano Field.** This field was discovered in May, 1949. It is located twenty miles east of Reynosa. More exploration drilling is needed before Pemex will know the potentiality of this field. As of, April, 1951, it had five wells producing 450 barrels of crude daily.

**Monterrey Field.** This field was discovered in December, 1949. It is nine miles southwest of the Reynosa field. This area in April, 1951 was producing 1,400,000
cubic feet of gas daily and 369 barrels of crude petroleum daily.128

**Brasil Field.** This field was discovered in 1948 but the field was not developed until late in 1949. It is located half way between the Reynosa field and the city of Matamoros. Pemex at first sought crude petroleum in this area but the field developed into a gas and distillate producer. The daily production of this field as of April, 1951 was 65,000,000 cubic feet of gas and 250 barrels of distillates.129

Pemex has also developed three other gas and distillate fields in the state of Tamaulipas: 1) Camargo field where it brought in two gas wells out of five wells attempted; 2) Mission field which has four gas and distillate wells out of eight wells completed; and 3) Valadeces field which has one gas and distillate well.130

The following table gives the gas production of these fields in 1950:
TABLE XIX

GAS PRODUCTION IN THE STATE OF TAMAU LPA S IN 1950

<table>
<thead>
<tr>
<th>Field</th>
<th>Gas production (cubic feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brasil</td>
<td>83,900,000</td>
</tr>
<tr>
<td>Camargo</td>
<td>491,500,000</td>
</tr>
<tr>
<td>Cano</td>
<td>36,700,000</td>
</tr>
<tr>
<td>Mision</td>
<td>2,039,200,000</td>
</tr>
<tr>
<td>Monterrey</td>
<td>43,000,000</td>
</tr>
<tr>
<td>Reynosa</td>
<td>1,309,400,000</td>
</tr>
</tbody>
</table>

In 1950 these fields produced 624,034 barrels of crude petroleum.

When one considers the potentiality of this area for petroleum development and the small staff of Pemex officials in charge of this development one can easily see a main obstacle facing Pemex today. This lack of trained personnel has limited the development of the northeastern zone. In charge of operations of the whole northeastern area are five petroleum engineers. Pemex also has three geologists, one paleontologist, two mechanical engineers and one production foreman. This small staff of technical and supervisory personnel has set up headquarters at the Reynosa field.

Although the equipment available for development is the best obtainable and allows the use of all the most modern techniques, if more was available the present fields and the discovery of new fields would be stepped up. Pemex now has ten drilling rigs in this district.
The most important fields in Vera Cruz are the Panuco and Golden Lane fields. The new developments in these areas are as follows:

Panuco Fields. Pemex has confined its development in this area to exploiting the existing fields. No significant new fields have been discovered in this area. This area was developed by the foreign oil companies and has produced 820,750,312 barrels of crude petroleum since its development in 1901. In 1950 Pemex extracted 8,795,444 barrels from this field.

Golden Lane Fields. This area consists of two separate sections: 1) a string of oil fields which extend due south from Lake Tamiahua to approximately thirty miles from the Poza Rica fields. No new development has taken place in this area; and 2) the Poza Rica fields. The new discoveries in the Poza Rica area are: 1) Mecatepec, which is located northwest of Poza Rica and now contributes 25,500 barrels of crude daily; 2) Escolín, which is south of Poza Rica and yields 22,000 barrels of crude daily; and 3) the Presidente Alemán, which is southeast of Escolín and has an average daily output of 2,000 barrels. The Golden Lane fields were discovered by the foreign oil companies in 1930 and since then have produced 412,066,550 barrels of crude petroleum. In 1950 Pemex extracted 46,716,165 barrels of crude petroleum from these fields.
In the past few years new petroleum fields have been discovered near the southern border of Vera Cruz. These fields are located on the Isthmus of Tehuantepec. The new fields are at Tonala, El Burro, El Plan and the Rabon Grande fields. This last field was the only field in this group that was not developed by Pemex. The only one of these fields that is sufficiently developed is El Plan which now contributes 14,800 barrels daily. The other fields in this area will become good producers as soon as facilities are made available to transport the petroleum to refineries.\(^{137}\)

Most of the fields in this Isthmus area were developed by the foreign oil companies in 1908. They have been the most productive of all petroleum areas in Mexico.\(^{138}\) Up to 1950 these fields gave up 1,102,598,133 barrels of crude petroleum. Pemex in 1950 extracted 8,962,121 barrels of crude from this area.

**Tabasco and Campeche**

Exploration activities have been limited in these two states. The only significant discovery was announced by Pemex in April, 1951 when in the region of Macuspana, Tabasco, a new field was discovered. This field has been named the José Colomo field in honor of Pemex's assistant director of production. This field produces 1,900 barrels of crude daily and as soon as transportation facilities are made available this field will be expanded.\(^{139}\)
We have already discussed the only significant development in the state of Campeche. This field developed by the Mexican American Independent Company, C.I.M.A., consists mainly of natural gas. Because of its location in the southeastern jungles of Mexico it is at the present time of very little value.

It is clear that none of the fields discovered and developed by Pemex have been of the caliber of those discovered by foreign oil companies prior to 1938. Nevertheless, these new fields are significant. They represent a step forward by Pemex. As soon as equipment is available to increase the productivity of the new fields, Pemex's dependency on the pre-expropriation fields will decrease.
CHAPT~R IX

CONCLUSION

When Mexico nationalized the foreign-owned petroleum industry in 1938, the country faced tremendous odds. Observers properly raised a number of pertinent questions concerning the future. Would the bureaucracy of an underdeveloped country be able to manage a highly complex multimillion dollar industry? Where would the nationalized industry obtain equipment, replacements and technicians in the face of the boycott by the expropriated companies? How could it export oil without tankers and markets? How could the national economy survive the loss of foreign exchange with exports of petroleum shut down? How much political pressure from England and the United States could the Mexican government withstand? These questions have now been answered. Mexico has overcome the odds. Mexico's government-operated petroleum industry is firmly established, and the United States and England have adjusted to the new situation.

What factors were mainly responsible in overcoming the obstacles which at first seemed insurmountable? There were two external and four internal factors which were mainly responsible in overcoming the most important obstacles. The two external factors were: 1) the "Good Neighbor"
foreign policy of the United States under which Mexican sovereignty was respected in the face of extreme provocation; and 2) World War II in which Mexican cooperation, as an ally, with the United States and Britain, and strategic-political considerations involving the security of the Western Hemisphere brought about a settlement between the Mexican government and the foreign oil companies.

The four internal factors were: 1) universal popular support, including that of the Roman Catholic church, of the Mexican government's action in nationalizing the petroleum industry; 2) ability of the government to control the trade unions, in particular the Petroleum Workers' Syndicate; 3) unexpected efficient management of Pemex by Bermúdez, based on competency rather than political influence; and 4) the channeling of petroleum to the internal market, thus assisting industrialization and creating new wealth.

What have been the results of Pemex's operations? Production of crude petroleum, which was 46,907,000 barrels in 1937, the last year of foreign operations, dropped to 38,506,000 barrels in 1938 and further declined to 34,815,000 barrels in 1942. After the reorganization of Pemex in 1947 petroleum production rose until it reached 72,117,000 barrels in 1950.

Another important accomplishment of Pemex was its ability to increase the total amount of exports of crude and
refined petroleum while domestic consumption was increasing. In 1937 the foreign oil companies exported 24,560,000 barrels of crude and refined petroleum. With the boycott in full force, the year 1938 saw Mexican exports drop to 8,564,000 barrels. The low point was reached in 1944 when 4,933,000 barrels left Mexico. Since 1947 Pemex has been able to raise its total of petroleum exports and the high point reached in 1950 when 23,308,000 barrels were exported.

A significant factor in Pemex's success has been the role of petroleum in the industrialization of Mexico. The index of the volume of production of manufacturing industries increased from 100 in 1937 to 148.3 in 1947. Figures are not available for the subsequent period but all indications are that the rhythm of growth has continued to the present day.  

It cannot be said that the availability of petroleum was the decisive factor in the recent development of Mexican industry because other factors were involved. Still the fact that petroleum was available for domestic consumption from 1938 on and could not be exported, had a marked influence on the increase in industrial development. Something had to be done with the surplus oil and, as a consequence, petroleum became the chief source of power for Mexico's industries.

Although Pemex has made rapid progress in the past years it still has many problems to solve, such as the lack
of capital, technicians and equipment. Also important in restricting Pemex's operations has been its continued reliance on imports of highly refined petroleum. Despite these shortcomings, the major political and economic crisis is over.

New resources for the solution of Pemex's problems can be seen on the horizon. Foreign capital is returning to Mexico but on different conditions than in the Diaz period. These new conditions would not conflict with the aims of the nationalization policy based on the Mexican Constitution. At the same time, this trend would indicate that the government-operated petroleum industry in Mexico, as a whole, has achieved a recognized stability.

Considered from a broader point of view, the experience of Mexico is not without current significance. Mexico was once the world's number two petroleum producer. Today her position is seventh. Had other conditions prevailed in 1938, which would have permitted an adjustment between the Mexican government and the foreign companies, it is conceivable that under continued ownership and management by private capital Mexican petroleum production would better have maintained its pre-eminent world position.

As for the United States oil companies, the experience in Mexico has had its value, even though the lesson was a costly one. At the present time, the British oil companies
are faced with a similar problem in Iran, and Iran is now somewhat in the position of Mexico in 1938. The complexities of the lessons of the past and problems of the present are well presented in a recent survey by the United States News and World Report, as follows:

What these United States companies learned in Mexico was how to co-operate with foreign countries in developing oil. From concessions that gave comparatively little to Mexico and her people, the companies turned quickly to plans assuring favorable returns to other oil-owning nations. Profits are split 50-50. Wage and labor policies are more liberal. Taxes are paid fully and promptly. Under those conditions, production has flourished, with little threat of nationalization, in countries such as Venezuela and Saudi Arabia.

British companies, slower to react, now may learn in Iran what U.S. companies found out in Mexico. And Iran, nationalizing, may draw from Mexico's experience a lesson that oil flows more freely under private management.
FOOTNOTES

CHAPTER I


4 Fanning, *op. cit.*, p. 27.


7 For further reading on this issue the following two books are recommended: Roscoe B. Gaither, *Expropriation in Mexico* (New York: William Morrow and Company, 1940) and Harlow S. Person, *Mexican Oil* (New York: Harper and Brothers, 1942). Gaither presents the views of the foreign oil companies while Person presents Mexico's side of the story.


9 Herring, *op. cit.*, p. 72.

11 Person, op. cit., p. 47.
12 Universidad Obera de Mexico, op. cit., p. 7.
13 Ibid., p. 105.
15 Fanning, op. cit., p. 52.
18 Herring, op. cit., pp. 75-76. See Appendix A and B for the expropriation decree.
19 Ibid., p. 66.

CHAPTER II

21 Herring, op. cit., p. 67.
23 "The heaviest loser from the expropriation was the Dutch-Shell group, which through its subsidiary, Mexican Eagle, at that time accounted for over 60 per cent of the Mexican output of crude oil and 70 per cent of Mexican Refining." United States Tariff Commission, op. cit., p. 129.
24 On February 7, 1946 an exchange of notes with Dutch and British diplomatic representatives was started by
the Mexican government. An agreement was reached for negotiating a settlement for the properties lost in the expropriation by British and Dutch nationals. On September 15, 1947, nine years after the expropriation, a settlement was finally reached. For Royal Dutch Shell's subsidiary, the El Aguila Petroleum Company, Mexico promised to pay 81,250,000 dollars over the following fifteen years plus 3 per cent interest. "Report to the Nation," *Time*, L (September 15, 1947), 37.


26 Since the symbol "$" is the same for both dollars and pesos, to avoid confusion the currency terms will be written out throughout this paper.

27 In the final settlement the Mexican government paid 23,995,991 dollars to the American oil companies as compensation for their properties of which 18,391,641 dollars was received by Standard Oil of New Jersey through its subsidiaries. The following table gives the losses claimed by the four major American oil companies:
TABLE II
LOSES FROM EXPROPRIATION IN MEXICO

(In United States dollars)

<table>
<thead>
<tr>
<th>Estimated gross loss</th>
<th>Compensation received</th>
<th>Estimated net loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>104,363,000</td>
<td>23,710,000</td>
<td>80,653,000</td>
</tr>
</tbody>
</table>

*exclusive of interest

Fanning, op. cit., p. 32.

The following is a breakdown of the 23,995,991 dollars paid to the American oil companies and their subsidiaries:

**Standard Oil of New Jersey group, 18,391,641 dollars:**
1. Huasteca Petroleum Company;
2. Mexican Petroleum Company;
3. Tuxpam Petroleum Company;
4. Pemexbua Petroleum Company;
5. Compañía Petrolera Ulises S.A.;
6. Compañía Transcontinental de Petroleo S.A.;
7. Compañía Petrolera Minerva S.A.

**Standard Oil of California group, 3,589,158 dollars:**
1. California Standard Oil Company of Mexico S.A.;
2. Richmond Petroleum Company.

**Consolidated Oil Company, 630,151 dollars:**
1. Consolidated Oil Company of Mexico S.A.;
2. Compañía Franco Española S.A.;
3. Compañía Petrolera Aldamas y Brava S.A.
Sabalo group, 897,671 dollars;
1. Sabalo Transportation Company;
2. Compañía Petrolera "Charipa" S.A.;
3. Compañía Petrolera Cacalilao S.A.

Seaboard group, 487,370 dollars:
1. International Petroleum Company;
2. Compañía International de Petróleo y Oleoductos S.A.

Person, op. cit., pp. 81-82.

28 "Oil, Gram of Flesh," Time, XXXIX (April 27, 1942), 82-83

CHAPTER III

29 McMahon, op. cit., pp. 138-139.
30 Ibid., p. 57.
31 Ibid., p. 59.
32 Ibid., pp. 148-149.
36 Williams, op. cit., p. 519.

39 *Loc. cit.*

40 "Mexico, Oily Dynamite" *Time*, XLVIII (August 5, 1946), 48.

41 "Mexico, No Lethargy," *Time*, XLIX (June 16, 1947), 42.

42 *Loc. cit.*

43 Henry Hazlitt, "Mexico's Oil and Export Problem," *Newsweek*, XXIX (February 24, 1947), 82.


CHAPTER IV

46 "Mexico, Attention Focused on the Isthmus," *Oil and Gas Journal*, 49 (December 21, 1950), 170-171. See maps I, II and III.


48 Henry Hazlitt, *Newsweek*, XXIX (February 24, 1947), 82.

49 United States Tariff Commission, *op. cit.*, 129.


Robert E. Spann, World Oil, 133 (August, 1951), 257-258.

Loc. cit. See maps I and III.

See maps I and IV.

"Mexico," World Oil, 133 (July 15, 1951), 160. See maps I, II, III, IV and V.

"World Crude Reserves," World Oil, 133 (February 15, 1951), 234. These areas will be discussed in Chapter VII.


See map I.

See map I.

See map I.

"Mexico," World Oil, 133 (August 15, 1951), 162.
CHAPTER V


68 In 1947, with world wide post-war readjustments, exports of manufactured goods fell to 19.2 per cent of total exports that year. Although in the following years there was a slight decline in these exports, the significant factor for us here is that the manufacturing industries had developed to a point where they were consuming a great deal more petroleum products than they were in the 1937-1939 period. *Fuel Investigation, Mexican Petroleum* (Washington, D.C.: Committee on Interstate and Foreign Commerce, 1949), pp. 41-42.

69 All other conditions being equal, the following table shows the importance of oil to the future of Mexico's industries when we compare it to other sources of power in terms of energy:
<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Energy per Pound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude oil</td>
<td>19,000 B.T.U.</td>
</tr>
<tr>
<td>Coal</td>
<td>15,000 B.T.U.</td>
</tr>
<tr>
<td>Grain Alcohol</td>
<td>11,000 B.T.U.</td>
</tr>
<tr>
<td>Wood</td>
<td>5,500 B.T.U.</td>
</tr>
</tbody>
</table>

*B.T.U. (British Thermal Unit) is the amount of heat required to raise the temperature of one pound of water one degree of fahrenheit. Stewart Schache, *Oil for the World* (New York: Harper and Brothers, 1950), P.5.


72 Committee on Interstate and Foreign Commerce, *op. cit.*, p. 57.


74 Residual fuel oil includes heavier residuals used for bunkering or fuel under boilers. Lubricating oil includes all grades of lubricating oil and oils used in grease manufacture. Kerosene includes all grades of kerosene for power, lighting and range use. Motor fuel includes aviation gasoline, other gasolines, and naphthas from crude and natural gasoline, alcohol or benzol blended.


77 Hughlett, op. cit., pp. 100-102.


79 See map I.

80 Committee on Interstate and Foreign Commerce, op. cit., p. 67.

81 See Map I.

82 See Map IV.

83 Committee on Interstate and Foreign Commerce, op. cit., p. 7.

84 The following table gives the exports of petroleum since nationalization:


TABLE XIV

EXPORTS OF CRUDE AND Refined PETROLEUM SINCE 1938

<table>
<thead>
<tr>
<th>Year</th>
<th>(barrels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1937</td>
<td>24,560,000</td>
</tr>
<tr>
<td>1938</td>
<td>8,564,000</td>
</tr>
<tr>
<td>1939</td>
<td>16,358,000</td>
</tr>
<tr>
<td>1940</td>
<td>18,733,000</td>
</tr>
<tr>
<td>1941</td>
<td>13,744,000</td>
</tr>
<tr>
<td>1942</td>
<td>6,303,000</td>
</tr>
<tr>
<td>1943</td>
<td>5,764,000</td>
</tr>
<tr>
<td>1944</td>
<td>4,933,000</td>
</tr>
<tr>
<td>1945</td>
<td>7,911,000</td>
</tr>
<tr>
<td>1946</td>
<td>9,406,000</td>
</tr>
<tr>
<td>1947</td>
<td>14,508,000</td>
</tr>
<tr>
<td>1948</td>
<td>12,097,000</td>
</tr>
<tr>
<td>1949</td>
<td>13,581,000</td>
</tr>
<tr>
<td>1950</td>
<td>23,308,000</td>
</tr>
</tbody>
</table>

Robert E. Spann, World Oil, 133 (August, 1951), 258. Mexico from 1918 to 1927 was the world's second highest producer and exporter of crude petroleum. In 1950, Mexico ranked seventh as an oil producer and eighth as an exporter of crude petroleum.


86 Robert E. Spann, World Oil, 133 (August, 1951), 258.

87 Committee on Interstate and Foreign Commerce, op. cit., p. 8.

CHAPTER VI


89 Hughlett, op. cit., pp. 99-100.

90 See map I.
CHAPTER VII


96 Loc. cit.

97 Committee on Interstate and Foreign Commerce, op. cit., p. 125.

98 Ibid., p. 126.

99 Ibid., p. 126.


102 "Mexico," World Oil, 133 (July 15, 1951), 100.

103 "Oil, Foot in the Door," Time, L (September 22, 1947), 88-89.


107 Loc. cit. See map I.


110 "Oil Deal Pending," Oil and Gas Journal, 50 (January 11, 1951), 30.


112 "Sinclair to Renew Mexican Operations?" Mexican American Review, XIX (September, 1951), 35.

113 Mosk, op. cit., pp. 103-104.

114 To cite an example of terms in another area, in Venezuela there is a fifty-fifty split between the concessionaires and the Venezuelan government. In Mexico the foreign oil companies received 15 to 18 per cent of production. While the foreign oil companies export almost all of Venezuelan oil, the companies in Mexico must sell the oil to Pemex.
CHAPTER VIII


118 The Middle East ranks first in proven reserves with 48,500,000,000 barrels. The basin between North America and South America ranks second with 39,500,000,000. These are followed by: Russia and her satellites with 7,000,000,000; other Western Hemisphere countries with 3,500,000,000; and other Eastern Hemisphere countries with 1,500,000,000. News item in the *New York Times Magazine*, August 5, 1951.


120 This figure represents the latest of estimated proven reserves in Mexico as of September, 1951.

121 Pratt and Good, *op. cit.*, p. 239.

122 Mark Olson, "Northeast Mexico, Vast Oil Frontier," *World Oil*, 133 (April, 1951), 266. See map I and IV.

“Mexico’s Fabulous Area of Oil Production,” World Oil, 133 (July 15, 1951), 128. See map IV.

The Panuco fields are located in Northern Veracruz close to the port of Tampico. The Golden Lane fields, of which the Poza Rica field is the most important, are located about thirty miles due south of the Panuco fields. This whole area is called the Tampico Embayment and is located in East Central Mexico. The area is approximately two hundred miles long and ninety miles wide. It is about the size of West Virginia. Up to the present time, January, 1951, about 6000 wells have been drilled in this area by the foreign oil companies before 1938 and Pemex since then.
See map I and III.

136 "Mexico," World Oil, 133 (November, 1951), 309.

See map III.

137 Ibid., 812. See map V.

138 Some writers have considered the Panuco and Golden Lane fields as one distinct zone. If one considers these two fields as one area then this zone has been the most productive area of Mexico. The combined production of the Panuco and Golden Lane fields since their development is 1,232,616,862 barrels of crude petroleum as compared to the 1,102,598,133 barrels of crude for the Isthmus area.

"Mexico," World Oil, 133 (July 15, 1951), 160.

139 "Mexico," Hispanic American Report, IV (May, 1951), 8. See map I and V.

CHAPTER IX

140 Naciones Unidas, Departamento de Asuntos Economicos, 1951 op. cit., p. 484.

MAPII PÁNUCO FIELDS

LEGEND

- OIL FIELDS
- GASFIELDS
- PIPELINES
- REFINERIES
- RAILROADS

SOURCE: WORLD OIL, 133 (JULY 15, 1951), 118-120.
MAP IV OIL AND GAS FIELDS OF NORTHEAST MEXICO

LEGEND

- OILFIELDS
- GASFIELDS
- PIPE LINES
- RAILROADS

SOURCE: WORLD OIL, 133 (JULY 15, 1951), 117-120.
Legend:
- Oil Fields
- Pipelines
- Refinery
- Railroad

Map of Isthmus Fields

Bay of Campeche

Source: World Oil, 133 (July 15, 1951), 119-120.
APPENDIX A

English Text of Petroleum Expropriation Decree, March 16, 1938
(from The Mexican Expropriation Law (Mexico, D.F.: Editorial Polis, 1938), pp. 56-61.)

Decree

Article 1. - The machinery, installations, buildings, pipe lines, refineries, storage tanks, stations, means of communications, tank cars, distribution stations, vessels, and all the other real and personal property of Compañía Mexicana de Petróleo "El Aguila," S. A., Compañía Naviera de San Cristóbal, S. A., Compañía Naviera San Ricardo, S. A., Huasteca Petroleum Company, Sinclair Pierce Oil Company, Mexican Sinclair Petroleum Corporation, Stanford y Compañía Sucesores, S. en C., Penn Mex Fuel Company, Richmond Petroleum Company de México, California Standard Oil Company of Mexico, Compañía Petrolera el Agu, S. A., Compañía de Gas y Combustible Imperio, Consolidated Oil Company of Mexico, Compañía Mexicana de Vapores San Antonio, S. A., Sabalo Transportation Company, Clarita, S. A., and Casalilao, S. A., are hereby expropriated and conveyed to the Government on grounds of "public utility," and insofar as said property may be necessary, according to the judgment of the Department of National Economy, for the discovery, extraction, transportation, storage, refinement and distribution of the products of the petroleum industry.
Article 2. - The Department of National Economy, supervised by the Department of Hacienda in its capacity of administrator of the property of the Government, shall immediately take possession of the property, object of this expropriation, and prosecute the necessary proceedings.

Article 3. - The Department of Hacienda shall pay the respective indemnity to the expropriated Companies in accordance with the provisions of Articles 27 of the Constitution and 10 and 20 of the Expropriation Law in effect, and within a period of time not to exceed 10 years. The funds therefor shall be taken, by the said Department of Hacienda, from a certain percentage, to be determined later, of the petroleum and its by-products, produced by the expropriated property, which percentage shall be placed in deposit of the Federal Treasury while the case is being prosecuted.

Article 4. - Let personal notice hereof be given to the attorneys-in-fact of the expropriated Companies, and this decree published in the Federal Diario Oficial.

This decree shall be in effect as soon as it is published in the Federal Diario Oficial.

Given at the Palace of the Federal Executive of the Union, on the eighteenth day of March, nineteen hundred and thirty eight. - The President of the Republic, Lazaro Cárdenas. - The Secretary of Hacienda and Public Credit,
Eduardo Suárez. - The Secretary of the Department of National Economy, Efraín Buenrostro. (Scrolls).

(Published in the Diario Oficial, dated March 19, 1938)
APPENDIX B

Spanish Text of Petroleum Expropriation Decree, March 18, 1938
(from The Mexican Expropriation Law (Mexico, D. F.: Editorial Polis, 1938), pp. 56-61.)

Decreto

Artículo 2.° - La Secretaría de la Economía Nacional, con intervención de la Secretaría de Hacienda como administradora de los bienes de la Nación, procederá a la inmediata ocupación de los bienes materia de la expropiación y a tramitar el expediente respectivo.

Artículo 3.° - La Secretaría de Hacienda pagará la indemnización correspondiente a las Compañías expropiadas, de conformidad con lo que disponen los artículos 27 de la Constitución y 10 y 20 de la Ley Expropiación, en efectivo y en un plazo que no excederá de 10 años. Los fondos para hacer el pago los tomará la propia Secretaría de Hacienda del tanto por ciento que se determinará posteriormente de la producción del petróleo y sus derivados, que provengan de los bienes expropiados y cuyo producto será depositado, mientras se siguen los trámites legales, en la Tesorería de la Federación.

Artículo 4.° - Notifíquese personalmente a los representantes de las Compañías expropiadas y publíquese en el "Diario Oficial" de la Federación.

Este Decreto entrará en vigor en la fecha de su publicación en el "Diario Oficial" de la Federación.

Dado en el Palacio del Poder Ejecutivo de la Unión a los dieciocho días del mes de marzo de mil novecientos treinta y ocho. - Lázaro Cárdenas. - Rúbrica. - El Secretario de Estado y del Despacho de Hacienda y Credito Público,
(Publicado en el "Diario Oficial" de 19 de Marzo de 1938.)
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"World Crude Reserves," World Oil, 133 (February 15, 1951), 67; 234.
"World Producing Wells," World Oil, 133 (July 15, 1951), 76.

NEWSPAPERS

ABSTRACT

The first successful commercial exploitation of Mexican petroleum took place during the last decade of Porfirio Díaz's regime (1900-1910). Favorable concessions were given to British and American oil companies. Under these conditions, Mexico by 1921 had become the world's second largest oil producing country.

The Revolution of 1910-1920 brought about profound changes in Mexico. There emerged a highly nationalistic orientation toward subsoil wealth. As a result, Article 27 of the 1917 Constitution vested ownership and control of mineral and petroleum deposits in the nation. In addition, there arose in post-Revolutionary Mexico a strong labor movement generally backed by the government. Under these new conditions, friction developed between the labor movement and Mexican government, on the one hand, and the foreign petroleum companies on the other, leading to the expropriation of the oil companies by the Mexican government on March 18, 1938.

After nationalizing the petroleum industry and setting up Petróleos Mexicanos (Pemex) as the government operating agency, Mexico was confronted with a number of critical problems, including a boycott by the expropriated oil companies, international political pressure, depreciation
of currency and great deficiencies in transportation, technical equipment and managerial competence. In addition, Pemex the new employer of the petroleum workers, was plagued with labor problems.

In 1942, with Mexico joining in the war against the Axis powers, a settlement was reached between the Mexican and United States governments over compensation for the expropriated oil companies, and the Mexican petroleum industry began slowly to recover.

In December 1946, Pemex was reorganized by President Aleman. He appointed Senator Bermúdez as director of Pemex. The degree of progress made by Pemex since December, 1946 can be largely attributed to the business-like manner in which Bermúdez has managed the affairs of the company. Production and refining difficulties at first seemed insurmountable for the government petroleum agency. The foreign oil companies in 1937, their last year in Mexico, produced 46,907,000 barrels of crude petroleum. Pemex in 1938 produced 38,506,000 barrels and production of crude further declined to 34,615,000 barrels in 1942. With Mexico's entry into the war in 1942, badly needed equipment and technicians were sent to Mexico. Production began to rise and by 1950 Pemex produced 72,117,000 barrels of crude petroleum.

The refining output of Pemex's plants followed the
same pattern as the production of crude. From a low of 99,000 barrels daily of refined petroleum in 1941, Pemex has upped capacity to 282,000 barrels daily in 1950.

Domestic demand for refined petroleum has risen steadily in Mexico, jumping from 24,006,000 barrels in 1938 to 59,648,000 barrels in 1950. An important factor in this increase was the new demand for fuel caused by the rapid growth of Mexican industry and the accompanying development of motorized transport.

Despite the fact domestic consumption has increased an average of 12 per cent a year since 1938, the production of crude has increased 15 per cent per annum on the average. This has allowed Pemex to export more and more petroleum each year. From a low of 4,933,000 barrels exported in 1944, Pemex in 1950 exported 23,308,000 barrels.

Not as promising for Mexico's foreign exchange situation has been the rapid increase of imports of highly refined petroleum. In 1938 Mexico imported 1,670,000 barrels of refined petroleum. In 1950 Pemex imported 7,450,000 barrels.

The exploration and development of new oil fields is a costly undertaking. President Aleman, realizing that Pemex neither had the capital nor the technical resources for this development, gave Bermudez authority to negotiate with foreign oil companies for exploration and development
of new oil fields. The new terms under which foreign oil companies are allowed to re-enter Mexico provide financial compensation on the basis of percentage of production rather than outright ownership as in the Díaz period. Some American oil companies have returned to Mexico, but there is still general reluctance on the part of foreign capital because of the uncertainty of the legality of the contracts and resentment at what happened in 1938.

In terms of increasing production of crude petroleum, the limited return of foreign capital has not yet affected the Mexican petroleum industry. It has, however, stepped up exploration activities which may assure Pemex of future oil fields. Thus, the estimated petroleum reserves of Mexico have risen from 870,000,000 barrels in January 1946, to 1,400,000,000 barrels as of September, 1951. There has also been an increase in the development of new wells. In 1943 only sixteen new wells were completed. Since that time Pemex's exploration activities have increased and in 1950, 217 new wells were completed. The results of this drilling activity can be seen in the new oil and gas fields opened up in the states of Tamaulipas, Vera Cruz, Tabasco and Campeche.

When Mexico nationalized the foreign-owned petroleum industry in 1938, the country faced tremendous odds. These
odds have been to a certain extent overcome and the Mexican government-operated petroleum industry is firmly established. New resources for the solution of Pemex's problems can be seen on the horizon with the return of foreign capital to Mexico.

Considered from a broader point of view, the experience of Mexico shows that although Pemex has made much progress, had the Mexican government and the foreign oil companies settled their differences in 1938, Mexico today would probably be in a much better position as a leading world producer of petroleum.