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Bolivia's potential logistical contribution to hemisphere defense, by Maj H. Justiniano Bolivian Army. CGSC. 1948-49.

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BOLIVIA'S POTENTIAL LOGISTICAL CONTRIBUTIONS  
TO HEMISPHERE DEFENSE

Hernan Justiniano G.

Major, Bolivian Army Air Force

Date submitted: 24 May 1949.



1 November 1948 ~~1949~~

STUDENT RESEARCH DIRECTIVE FOR SUBJECT NUMBER 10-5

STUDENT Hernan Justiniano G., Maj. Bolivian Army Air Force  
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SUBJECT Bolivia's Potential Logistical Contributions to Hemisphere  
Defense

PURPOSE: To develop the logistical problems, and their possible solutions, in the event that Bolivia should become actively involved in Hemisphere Defense.

SCOPE: (Brief outline of subject coverage)

- A. Principal Bolivian logistical resources suitable for war purposes:
  - a. Minerals.
  - b. Petroleum.
  - c. Rubber.
- B. Transportation.
- C. Labor.
- D. Organization of Industries.
  - a. For production.
  - b. Maintenance of plants and equipment.
  - c. Training of personnel in industry.
- E. Effects of modern warfare on Hemisphere Logistics.

NOTE TO STUDENTS:

1. The scope suggested above is intended as a guide only and is not to be construed as a limitation on the students perusal of the subject. The student is encouraged to modify the above scope as he may find necessary to outline and define the specific problem he visualizes and proposes to develop in his research study.

(over)

2. The references below are furnished to give the student enough material with which to begin his research. It is anticipated that the student will make use of other available sources in order to give adequate scope to his subject, and to include latest developments pertaining to the subject.

REFERENCES: Tourist Guide -Bolivia- 1946  
Personal notes

COORDINATION: (Confer with the authors of these subjects for pertinent information and coordination)

4156 Procurement Problems -Col. House-

4009 Central and South America-LtCol.Slaughter-

REMARKS:

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BOLIVIA'S POTENTIAL LOGISTICAL CONTRIBUTIONS

TO HEMISPHERE DEFENSE

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HERNAN JUSTINIANO G.

MAJOR, BOLIVIAN ARMY AIR FORCE

Date submitted: 24 May 1949

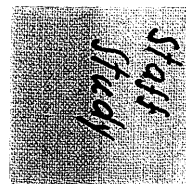


Command and General Staff College

Department of Logistics

Fort Leavenworth, Kansas

File No. 10-5



SUBJECT: Bolivia's Potential Logistical Contributions to  
Hemisphere Defense

TO: Director, Department of Logistics, C&GSC

1. PROBLEM. a. To develop the economic potential of Bolivia with particular emphasis in the production of critical materials for war purposes.

b. To develop the logistical problems, and their possible solutions, in the event that Bolivia should become actively involved in Hemisphere Defense.

2. ASSUMPTIONS. a. That in case of attack to the Western Hemisphere by any foreign power, Bolivia is at the side of the defending nations of the Hemisphere.

b. That in case of emergency in the Hemisphere, present treaties of mutual assistance, at that time, are still in effect.

c. That potentialities and problems of Bolivia are considered potentialities and problems of the Continent, when speaking of planned defense.

3. FACTS BEARING ON THE PROBLEM. a. Obligation of Bolivia to participate in the defense of the Western Hemisphere, by virtue of the treaty of mutual assistance among all nations of the Continent, signed in Rio de Janeiro, the year 1942.

4. DISCUSSION. a. Principal Bolivian logistical resources suitable for war purposes. Bolivia is well known in the world for its tremendous resources, especially minerals (tin, wolfram, antimony, zinc, and tungsten), and other resources suitable for logistical purposes, such as petroleum and rubber, which in case of emergency

may become critical war materials. (See annex No. 3.)

b. Transportation. The system of transportation in Bolivia is inadequate. Railways and highways do not at the present time meet the continuous growing requirements of Bolivian economic life. River navigation is still in its beginning and air transportation is not so extensive as to cover existing demands. (See annex No. 4.)

c. Labor. One of the negative factors in Bolivia's production is the lack of manpower. The majority of the Bolivian labor force is practically of Indian origin. (See annex No. 5.)

d. Organization of industries. Manufacturing industries are, for the present, limited to production of simple articles for local consumption, with very small probability of expansion, due principally to lack of coal. (See annex No. 6.)

e. Effects of modern warfare on Hemisphere Logistics. Considering Russia, as the most probably common enemy, in aerial terms, Alaska, Canada, and Newfoundland would be the deployment belt; the United States the industrial belt and land barrier between Eurasia and Latin America, both belts targets of enemy air attack: since air power of global range would attack vital industries, operating from continental home bases; and South America would be an aerial backyard, safely outside the aviation reach of Russia, the supply belt, and vital reservoir of food and strategic materials, which should be developed to support the effort in the other two zones. (See Annex No. 7.)

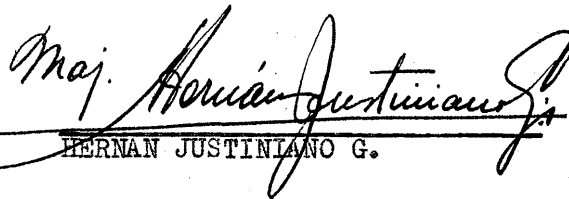
5. CONCLUSIONS. Some strategic materials such as tin, wolfram, antimony, zinc, tungsten, rubber, petroleum, necessary to support the defense of the Western Hemisphere, are available in Bolivia. The production, although handicapped by problems of transportation and labor, can be increased probably to the extent of meeting needed requirements. (See Annex No. 8.)

6. ACTION RECOMMENDED.

a. In the Hemisphere as a whole: Implement plans for the development of the economic potential of Latin America. (See

annex No. 9.)

b. In Bolivia as a part of the Western Hemisphere: Implement plans for the development of the economic potential of Bolivia. (See annex No. 9.)

  
HERNAN JUSTINIANO G.

Maj., Bolivian Army Air Force

ANNEXES:

1. Draft Memorandum to the Commandant, C&GSC
2. Draft Letter of Transmittal to Director of Logistics, GSUSA
3. Principal Bolivian Logistical Resources Suitable for War Purposes
4. Transportation
5. Labor
6. Organization of Industries
7. Effects of Modern Warfare on Hemisphere Logistics
8. Conclusions
9. Action Recommended

CONCURRENCES: (Omitted)

NONCONCURRENCES: (Omitted)

CONSIDERATION OF NONCONCURRENCES: (Omitted)

ANNEXES ADDED:

- Map A: Location of Bolivia in the Hemisphere
- Map B: Resources of Bolivia
- Map C: Bolivia Economica
- Map D: Sketch of Physical Features of Bolivia
- Map E: Vinculacion Ferroviaria de Bolivia con el Continente
- Map F: Servicios Aereos en Bolivia
- Map G: Ferrocarril Transcontinental Santos-ARICA

APPROVED:

May 1949

F. A. HENNING  
Colonel, FA  
Director

ANNEX NO. 1

SUBJECT: Bolivia's Potential Logistical Contributions to  
Hemisphere Defense

24 May 1949

TO: Commandant, C&GSC

1. I concur in the recommendation of the attached research study.

2. Request that this study be transmitted to the Director of Logistics, GSUSA, by means of a letter, (annex 2) which has been prepared for your signature.

F. A. HENNING

Colonel, FA

Director, Department of Logistics

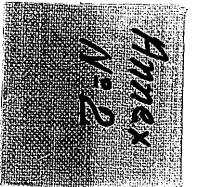
Annex  
N:1

ANNEX NO. 2

COMMAND AND GENERAL STAFF COLLEGE  
FORT LEAVENWORTH, KANSAS

SUBJECT: Bolivia's Potential Logistical Contributions to  
Hemisphere Defense

TO: The Director  
Logistics Division, GSUSA  
The Pentagon  
Washington 25, DC



1. The attached Staff Study, title: Bolivia's Potential Logistical Contributions to Hemisphere Defense is transmitted to you for consideration and appropriate action.

2. The research study was prepared by a student in this College and concurred in by the Director, Department of Logistics. The recommendations made for the implementation of plans for the development of the economic potential of Bolivia for the purpose of defense of the Western Hemisphere appear to have considerable merit.

M. S. EDDY

Lt Gen, USA

Commandant

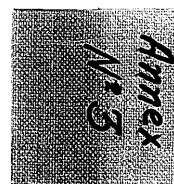
ANNEX NO. 3

PRINCIPAL BOLIVIAN LOGISTICAL RESOURCES SUITABLE

FOR WAR PURPOSES

1. PRINCIPAL BOLIVIAN LOGISTICAL RESOURCES SUITABLE FOR WAR PURPOSES. Bolivia, the fifth largest country on the continent, situated in the heart of South America, (see Map A) has a territory of 1,058,887 square kilometers (416,040 square miles), about the size of Arizona, New Mexico, Nevada, and half of Colorado; and a population of approximately 4,000,000 inhabitants, of which 25 percent are white, 25 percent mixed, and 50 percent Indians. It is very well known in the world for its tremendous resources, for being the country of tin, and for its spectacular inhabited regions high above sea level. It is also known for other resources of equal or similar value that show it to be a land of future, particularly because of its unlimited economic potentialities, which with time, will unquestionably become a recognized bulwark of Hemisphere defense.

a. Minerals. The potential mineral wealth of Bolivia is considerable. Vast inexhaustible mineral deposits were worked a very long time ago, since the early days of the conquest. The discovery, towards the middle of the sixteenth century, of the silver mines in the so-called Rich Mountain of Potosi, opened up a period of 200 years during which this part of the world led all others in the production of that metal. The City of Potosi, wholly dependent upon its mines, reached in colonial times a population of 200,000 inhabitants, and was at that time one of the largest cities of Latin America. Even during the republican period, and when other mines had taken the place of those of Potosi, silver continued to play a dominant role in Bolivian exports. Because of rapidly falling prices, the production of silver declined sharply around 1870. But this decline was



simultaneous with the appearance of tin mining, which starting the year 1900, has been gaining importance constantly, until reaching the position that silver had through several centuries.

Today, Bolivia is an essentially mining country, even though considering that this industry is still in its beginning. Nevertheless, it is mining industry that from colonial times has sustained the majority of the population, guided the construction of our main railroads and highways, and provided with almost all of Bolivia's foreign exchange. It is mining industry that dominates Bolivia's economy, providing 95 percent of our exports, and 50 percent of the Government's revenue, being the stability of our money intimately tied up with the exploitation of tin, wolfram, antimony, and other mineral products of secondary importance. It is mining industry that, in other words, has been the immediate agent of the nation's development.

(1) Tin. The production of tin, for numerous reasons, expanded with great rapidity; high prices, increasing demand, the shutting down of the silver mines as a result of which miners found themselves without work, the construction of our main railways which facilitated access to the outside world both via the Pacific and the Atlantic, and finally, the activities of Simon I. Patino, the man responsible for the spectacular rapid exploitation of his mines.

The Bolivian tin belt, which since 1920 has each year produced between 19,000 and 46,000 tons, extends along the upper reaches of the Eastern Andes, on a line whose general direction is north and south. (See map B.) Few mines are situated at altitudes of less than 12,000 feet, and some are located as high as 16,000 feet above sea level.

Three large companies are responsible for the 70 percent to 80 percent of the total production of tin, the remainder being in hand of individuals that can be described as small producers:

(a) Patino Mines Company's Export, which in

1929, accounted for approximately 60 percent of the entire value of Bolivia's tin shipments, and in 1941, for approximately 50 percent.

(b) Mauricio Hoschild Mines Company, whose activities date back to 1920, responsible in 1929, for only 10 percent of the total production, but in 1941 it increased to 25 percent.

(c) The third large firm concern is a Swiss corporation which produces approximately 5 percent of the total.

The largest tin production on record was that of 1929, when our mines produced 46,000 measurement tons. During the following years production fell off because of competition from tin deposits in the Malay States, the East Indies, and other tin-producing areas of secondary importance, and also because of a labor shortage. However, by 1942, production had climbed back to 39,000 measurement tons.

International control, and allocation of quotas to the several tin-producing countries, are factors involved in our tin production.

Before the World War II, all our tin was sent to smelting plants in Great Britain. At the present time it is brought to a plant in Texas City, in the United States of America.

In view of the growing demand for tin, the producers of this metal signed a special agreement with the Metal Reserve Company to deliver about 18,000 tons of the finished product annually, for a period of 5 years. The contract expired, but has been renewed several times for further periods.

The Texas Smelting Plant was specially designed and constructed, with the assistance of the Government of the United States, to handle Bolivian tin, and it is capable of producing 25,000 tons of the finished product per year.

(2) Wolfram, antimony, zinc. Bolivia is one of the world's large producers of wolfram. In the year 1942, our production reached 3,363 tons. In the same year our production of antimony reached 17,642 tons, and that of zinc reached 10,099 tons. These

figures show a considerable increase over the production of these metals in previous years.

(3) Other minerals. Production of secondary minerals is mainly in the hands of the leading tin companies, due to the fact that these companies are able to use their installations and facilities for their exploitation, with the following exceptions:

(a) Copper, produced by the American Smelting Company.

(b) Antimony, produced by small mining concerns.

The production of copper reached in the year 1944, 6,170 tons, and that of antimony, 16,536 tons. Other minerals are exploited as follows:

(a) Tungsten, 7,935 tons, in the year 1944.

(b) Zinc, 21,074 tons, in the year 1943.

The importance of Bolivia's mining production, especially tin, can be measured not only by the benefits that it confers the country, but also, and more particularly, by the fact that our land is today the first and most important source of tin in the Allied world.

b. Petroleum. The oil zone of Bolivia covers almost all of its territory, running the entire length of the Eastern Mountain and following the general direction of its foot hills. (See maps B and C.) Attempts to exploit petroleum in Bolivia were made in the year 1920, when the importance of this new source of national wealth, previously overlooked, began to be recognized. So far our oil production is not large enough to cover our domestic needs because of the following reasons:

(1) Insufficiency in production.

(2) Lack of adequate means of transportation.

The problem of petroleum exploitation in Bolivia, has been a very difficult one. The Standard Oil Company, after a considerable period of prospecting, initiated the development of the oil deposits now in exploitation; but this concern came into conflict with our

national interests, and therefore, in the year 1936, the Government of Bolivia expropriated the Standard Oil Company's concessions. In compensation Bolivia paid the Company, in 1942, the sum of \$1,700,000.

Many of our neighbors have a great interest in our oil, and special agreements have been signed with Argentina and Brazil. These two countries are supplying to Bolivia the necessary funds for the construction of two railways:

(1) Financed by Brazil: From Corumba (Brazil) to Santa Cruz (Bolivia).

(2) Financed by Argentina: From Yacuiba (Bolivia) to Santa Cruz (Bolivia).

In return, Bolivia will pay the cost of these two railroads with special oil concessions.

Bolivia's plans for the exploitation of oil in the immediate future, include the development of other railroads and highways within the country, and the construction of several pipe lines leading to the populated centers.

Our petroleum production had, as recently as 1942, reached 308,000 barrels, and of this, a considerable part was sent to Argentina, in accordance with the terms of existing treaties.

Responsibility for the planning, exploitation, and development of Bolivian oil is now entrusted to an independent agency called "Yacimientos Petroliferos Fiscales Bolivianos." This agency has not succeeded in covering the continuous growing demand for oil for domestic consumption, but its promising activities now under way, will unquestionably achieve in the future its objectives.

"Yacimientos Petroliferos Fiscales Bolivianos" within its possibilities have been developing intensely the functions assigned by the Government. Because of the limited funds at the disposal of this agency, it cannot develop a wide program of exploitation all over the oil zone of the country, and only the

wales of "Camiri," "Sanandita," and "Bermejo" are under exploitation with satisfactory results so far.

During the first 8 years of life, "Yacimientos Petroliferos Fiscales Bolivianos" have had an industrial development with the responsibilities of its administration assigned to some other organization. After a careful study, in May 1944, the Government of Bolivia created two independent organizations, one under the name of "Yacimientos Petroliferos Fiscales Bolivianos" (the old agency) with the following mission.

- (a) Study the zone or zones of oil.
- (b) Exploit oil and by-products within the zone assigned.
- (c) Develop the petroleum industry as a whole.
- (d) Prepare Bolivian technical personnel to be assigned to this new industry.

The other organization, under the name of "Distribuidora de Yacimientos Petroliferos Fiscales Bolivianos" with the following mission:

- (a) Transport the production of oil to the centers of consumption.
- (b) Distribution of petroleum all over the country.

Within the functions assigned to each of these organizations, "Yacimientos Petroliferos Fiscales Bolivianos" is making further studies to intensify the exploitation of new areas, such as "Camatindi" which has been revealed as one of the richest, and the region of "Guayrui," located generally south of "Camiri" and close to the Argentinian boundary.

Funds assigned to the development of the oil industry can scarcely cover the cost of a minimum part of the job, such as certain roads of access to the wales and the completion of the pipe line from the center of production to the center of consumption, where distribution of refined products can be accomplished much more

easily and more economically.

Bolivia, in an effort to finish this very important task, recognized by Government and people, is devoting the maximum of its energies, and there is no doubt that in 1 or 2 more years, we may enjoy the benefits of consuming our own production of oil and its refined products.

By direction of the Bolivian Government, studies for the construction of both the pipe line and refinery, have been accomplished, respectively, by the American firms Foster Wheeler Corporation of New York, and Williams Brothers, the estimated cost of construction of the refinery alone being about 7 million dollars, and capable of producing gasoline of high octane, lubricant oils, kerosene, Diesel oil, and other products. In the meantime "Distribuidora de Yacimientos Petroliferos Fiscales Bolivianos" has been increasing our actual system of transportation by truck, in order to store in the populated centers of the country as much gasoline as possible, and thereby reducing the problem of rationing this product which we have had during the last years.

It may be seen by the study previously outlined, that the main factor considered for the development of the oil industry in Bolivia has been the minimum capital necessary for the most vital constructions of the pipe line and refinery. Thereafter, and according to our potential economy, other means of transportation can be developed, such as railways, highways, etc.

There is no question about the importance of facing this problem in the most serious manner, particularly under the point of view of the defense of the Western Hemisphere. It is known that an adequate supply of oil, considering its constant increase in demand, is one of

the most difficult problems to be solved by the American nations in relation with the defense of the Hemisphere. The following figures about the actual situation of oil in the Western Hemisphere, and that expected for the year 1951, may give an idea of the general picture of this problem:

	Consumption in Barrels per day	Production in Barrels per day
1947-----	6,500,000	7,000,000
1951-----	7,500,000	7,300,000

These figures, of course, may have variations, but it is anticipated a deficit in production as compared with the consumption for the year 1951.

Unquestionably the demands for oil will continue to increase, especially in case of war, since to carry out the war effort it is necessary the use of very many machines, simple and complicated ones, besides the increased consumption of modern aircraft powered by jet engines, which is as high as five times the consumption of the conventional internal combustion engine.

c. Rubber. Northward, in the basins of the "Beni" and the "Mamore," is the center of what was once the richest rubber-producing section in all the Amazon Basin. (See maps B and D.) An area of approximately 300,000 square kilometers (117,000 square miles) is covered with natural plantations of rubber ("Hevea Brasiliensis"). The cost of production and the market price make prohibitive its exploitation. However, due to the World War II, when rubber became a critical material, this industry was restored to importance, but in a relative small scale of production compared with the existence of the product, because of the lack of manpower, deficiency of means of transportation, and also because of the hazards of Malaria fever in the areas of exploitation.

## TRANSPORTATION

1. TRANSPORTATION. One of the most conspicuous facts about Bolivia is the inadequate system of transportation. Our railways and highways do not at the present time meet the continuous growing requirements of our economic life. Navigation in our rivers is still in its beginnings; and air transportation is not so extensive as to cover existing demands. One of the main difficulties founded to increase our means of transportation, particularly by rail, is the topography of our territory, especially in the areas where population and business are of consideration, which are covered by high mountains of the "Cordillera de los Andes." (See map D.) Other obstacles are constituted by the jungle of the Amazonic zone in the northern and eastern part of the country, and the zone of the deep valleys east of the Andes.

The extension of our railroads (1,500 miles) and highways (3,710 miles), may give a more accurate idea about these means of transportation. Also, the amount of passengers per mile, and tons per mile (755,000 in the year 1943), transported by air within the country give a concept of our capacity for air transportation of both passengers and cargo.

a. Railways. Bolivia, a country without any outlet to the ocean, had to give a first priority to the construction of a railway net designed to meet our minimum requirements of trade with the interior and exterior of the country. (See map E.) This net is actually in exploitation, and connects our industrial centers with the foreign market.



Within Bolivian territory there are 2,500 kilometers (1,500 statute miles) of railways in exploitation, whereas the total of lines under construction reach about 400 kilometers (250 statute miles), and 2,500 kilometers (1,500 statute miles) in project.

Railways of property of the State are the following:  
Arica-LaPaz (Bolivian Section)

Villazon-Atocha

Potosi-Sucre

LaPaz-Yungas

General Pando-Corocoro (a branch of the line Arica-LaPaz)

Cliza-Arani-Vilavila (130 kilometers or 80 statute miles of the line Cochabamba-Santa Cruz).

About 1 year ago, although provisionally, the operation of the following lines were started:

Puerto Suarez-Robore, in the Corumba (Brazil) -Santa Cruz (Bolivia) railroad line, covering an extension of approximately 250 kilometers (155 miles).

Sucre-Tarabuco, in the railroad line Sucre-Camiri, both connecting the oil fields of Bolivia.

Railways of private property are the following:

Antofagasta (Chile) to Bolivia (Bolivian Section)

Ollague-Oruro (Bolivian Section of the Antofagasta and Bolivian Railway Company).

Oruro-LaPaz, of the Bolivian Railway Company

Oruro-Cochabamba, of the Bolivian Railway Company

Rio Mulato-Potosi, of the Bolivian Railway Company

Uyuni-Atocha, of the Bolivian Railway Company

Guaqui-LaPaz, in connection with the navigation line of Lake Titicaca, of the Peruvian Corporation.

Machacamarca-Uncia, of the Patino Mines Company

Uyuni-Huanchaca, of the Huanchaca Company

(1) International railroads. The following

international railroads connect Bolivia with the outside world:

(a) The Villazon-LaPaz railroad, which crosses almost all of the Bolivian Altiplano, and forms a junction with the Argentine railways at Villazon. It is one of our open ways for trading, and gives Bolivia an outlet to the Atlantic Ocean through Buenos Aires.

(b) The Arica-LaPaz railroad, over which Bolivia sends her products to the Pacific.

(c) The Antofagasta-LaPaz railroad, which is as useful as the line Arica-LaPaz.

(d) The Guaqui-LaPaz railroad, which together with the Steamship Company operating on Lake Titicaca and with the railroads of Southern Peru, gives Bolivia access to the Port of Mollendo in the Pacific.

Two other international railways, each connecting Bolivia to the Atlantic, are presently under construction; one, through Brazil, is to connect Santa Cruz (Bolivia) with the Brazilian Port of Santos; the other, passing through Yacuiba, a town on Bolivia's southern border with Argentina, will join the Santa Cruz District to Buenos Aires.

(2) Domestic railroads. (a) Potosi-Sucre-Camiri railroad. We consider this line as a part of the central system of railway transportation, and it is designed to reach the important center of oil production, with the idea of prolonging it to a port on the Paraguay river.

(b) Cochabamba-Santa Cruz railroad. Because of the tremendous projections within our economy, this railroad constitutes the axis of the national railway system. It will be the lateral route that will join the Atlantic Ocean to the Pacific Ocean, from Santos

(Brazil) to Arica (Chile).

(c) Guaqui-LaPaz railroad. (See subparagraph (4) of International Railroads.)

(d) LaPaz-Yungas railroad. This line has been designed with the main objective of reaching the forest of the northern part of the country; up to date it has an extension of only 54 kilometers (33.6 miles), being its construction paralyzed because of the lack of funds. It is the purpose of the Bolivian Government to continue the construction of this line as soon as other lines more vital to our economy and therefore with first priority are finished. This project will eventually reach Puerto Fando on the Beni Basin, which as previously described is very rich in natural resources of rubber.

(3) Summary. (a) Railways in exploitation:

	<u>Kilometers</u>	<u>Miles</u>
(i) Property of the State-----	1,055.5	656.5
(ii) Private property-----	1,420.0	883.5
(b) Railways under construction-----	393.0	244.3
(c) Railways in project of construction-----	3,897.0	2,425.0

b. Highways. The Bolivian road net system, with a total of 3,710 miles in operation, has been designed according to the topographic characteristics of the country, with the purpose of connection the rich zones in agricultural products to the centers of consumption where mining industry constitute the main market.

Our topography determines the difficulty in maintaining our highway system. Therefore, the conservation of the road net throughout the country, to expedite a good traffic circulation around the year, is a rather difficult problem, but carried out satisfactorily so far.

Turning now to international highways, the network that will form a part of the Pan American Highway is already carrying traffic back and forth among the principal cities of the country. Originating on the Desaguadero, at a point on Bolivia's frontier with Peru, it passes through LaPaz, Oruro, and Potosi, and then proceeds, via Sucre, to Villazon on Bolivia's frontier with Argentina.

c. River navigation. The navigation net of Bolivia is constituted by the northern and southern hydrographic systems with a total of 12,000 miles of navigable rivers, being the northern system the main one, which drains through the rivers Mamore, Beni, Itenez, and Madeira into the Amazon. (See map D.) During the dry season of the year, some of these rivers are not completely navigable; however, navigation in small boats of 100 tons cargo capacity, approximately, is always possible.

d. Air transportation. Because of the geographical peculiarities of Bolivia, commercial aviation is one of the most effective means of our transportation system. The relevant network of the domestic airlines, with more than 5,000 miles of operated airlines within our territory, under the management of "Transportes Militares de Bolivia," "Corporacion Boliviana de Fomento," and the Company "Lloyd Aereo Boliviano," shows a high degree of air transportation activity. (See map F.) However, the frequency of these services

are not adequate for the country's needs, and consequently all types of aviation can look forward to a promising future. Very many sections of the country have gone, from the age of mule transportation to that of air transportation; this phenomenon will unquestionably be repeated in certain sections where economic and social interests will require the most rapid means of transportation available. This normal course of historical development in the field of transportation, means that airlines will penetrate certain regions ahead of the railroads and highways.

As for the international air traffic, the Pan American Grace, Inc., and the "Lloyd Aereo Boliviano," are the two companies that carry out Bolivia's international service. Since both are connected to airlines serving Europe and the United States of America, they enable Bolivia to communicate rapidly with the outside world.

e. Communications. As regards other means of communications, such as radiotelegraph and telephone, these are pretty well organized, providing rapid communication among the population centers and remote portions of the country, and between these centers and the outside world. The following numerical information may give a better idea about our communication system:

Telegraphic wire-----6,000 miles in operation  
Telephonic wire-----7,000 miles in operation  
Telephones-----5,000 in operation  
Radio transmitters and receivers ---50,000 in operation.

ANNEX NO. 5

LABOR

1. LABOR. From the standpoint of the nation's production, one of the negative factors at the present time is the resource of manpower which although full of promise for the future, constitutes a great and difficult problem. The majority of our labor force (12,000 wage earners employed in industry, and 6,000 in the mines) is practically of Indian origin. What we<sup>have</sup> left of the Indian Civilization of the days before the Conquest, reveals a high degree of engineering and mechanical knowledge. The Spanish assert in their writings that the Conquerors found a highly integrated type of social organization, but along with the other aspects of Indian Civilization, skill, science, and social organization, have disappeared after the Conquerors had occupied their land.

The majority of the Indians on the Altiplano and in the Valleys have not yet learned to read and write. They speak their own dialects, Aymara and Quechua.

As a result, the production in Bolivia requires also the solution of an ethical and cultural problem; the making of the Indian a responsible participant in our productive and economic activity.

I shall point out that this problem is not a problem peculiar to Bolivia only. It is rather a Hemisphere problem, the solution to which has a definite bearing upon Hemisphere Defense. There is no doubt that to transform the Indian into a productive and economic factor, and to make of him a good hemisphere soldier, is a complex task, but it is also an urgent one.

The Government of Bolivia, within the limits set

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N:5

by her resources, is endeavoring to solve in a realistic and practical manner this problem, but the process is extremely slow.

Bolivia pins her faith not only upon finding a solution to this labor problem which is in direct relation to the nation's production, and therefore of essentially economic character, but also upon the flow of immigrants, who in a period of time much shorter than estimated might change fundamentally the picture of our production and economy, conferring thereby a tremendous benefit to the country and to the Hemisphere.

ORGANIZATION OF INDUSTRIES

I. ORGANIZATION OF INDUSTRIES. a. For production.

The technique to convert minerals and other raw materials in finished products constitute the industrial capacity of a nation. This capacity can be divided in three general categories:

(1) The technique to manufacture elements of production (machines and tools, ships, locomotives, etc.).

(2) The technique to produce complicated articles of consumption (automobiles, radios, refrigerators, etc.).

(3) The technique to produce simple articles of consumption (shoes, textiles, etc.).

I have discussed the capacity of Bolivia to produce minerals, petroleum, rubber, and our problems of transportation and labor. For a very long time we have been facing the dangers involved in the production of only one product, tin, as the basis of our economy. We, Bolivians, are well aware of this fact, and have in recent years been seeking an adequate remedy, which in broad terms involves the conversion of our artificial mining economy into an economy built upon agriculture, and the creation, at the same time, of means of transportation to enable distribution over all our territory. The Bolivian Government, in order to carry out this program has established an agency, The Bolivian Development Corporation, with the task of developing not only the expansion of agriculture, but also the development of the communications network, the controlled growth of mining and oil production, through the agency mentioned under the name of "Yacimientos Petroliferos

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No. 6

Fiscales Bolivianos," and the promotion of public education.

Since manufacturing industries are, for the present, limited to production of simple articles (third category) for local consumption, with very small probability of expansion, due principally to lack of coal, the main program of the Bolivian Development Corporation is to develop agriculture, which will involve the stabilization of Bolivian finances, and at the same time improve the standard of life for the population.

b. Maintenance of plants and equipment. This is another problem faced by our industry with certain difficulty, due particularly to the lack of technical personnel, and technical schools to train them. In most of the cases, for the proper maintenance of our plants and equipment, the necessary personnel is obtained from foreign countries, especially from the United States and England, where our industry hire, at high cost, engineers to work in the mines, in the oil fields, and in the railroads. However, maintenance of what we have, although at high price, is accomplished.

Progress has been made in this respect during the last years, with the flow of students to Universities and Technical Schools of the United States, Mexico, Argentina, and Brazil, but at a very slow rate, since the percentage of engineers, and technical personnel, minimum for the operation and maintenance of our plants and equipment, trained or in process of training is far below of what we need to meet the constant growing demand in practically all the fields.

Insofar as spare parts are concerned, their requirements and acquisition for the purposes of

maintenance, do not present any problem, since they are manufactured in the United States, where they are bought by our industry.

c. Training of personnel in industry. I have just pointed out under paragraph b one of the deficiencies faced by our industry, the lack of trained technical personnel for both the operation and maintenance of plants and equipment at our disposal, as well as for new installations. The Bolivian Government has gradually come to recognize this fact and the great importance which should be assigned to an educational program in general, and in particular to the training of engineers and technicians in the fields of mines and oil production. Towards this end an effort is today being made to improve the picture, by creating new universities, new schools of engineering, schools of mines, and by sending some of our students to foreign countries, where they are expected to get knowledge in the several fields of engineering. Thus, the Bolivian Government is endeavoring to impress a new direction upon the nation's education and training, with a relevant educational program already under way.

## EFFECTS OF MODERN WARFARE ON HEMISPHERE LOGISTICS

1. EFFECTS OF MODERN WARFARE ON HEMISPHERE LOGISTICS. After reviewing the outstanding characteristics of the Republic of Bolivia, an analysis of some military concepts, particularly related with interhemispheric air warfare, would give an idea of the picture of the Hemisphere and its defense as a whole, providing the highlights to put in effect the treaty of mutual assistance to which I have referred previously, and the recommended actions, as I see them, for the best use of whatever Bolivia would be able to give in defense of Hemisphere survival.

First, let me consider Russia as the most probable common enemy. In aerial terms, the United States would constitute the land barrier between Eurasia and Latin America, and South America would be an aerial backyard, safely outside the aviation reach of Russia. In other words, in the next war, the American Hemisphere would probably be strategically divided roughly into three belts:

- a. The first, including primarily Alaska, Canada, and Newfoundland, would be the deployment belt, from which long range striking air force would carry war to the heart of the enemy.
- b. The second, constituted primarily by the United States, would become essentially the industrial belt, producing the means for waging war. It would be a primary target of enemy attack, and this would require the most concentrated defenses.
- c. The third zone, all of Central and South America, would become the supply belt, the vital reservoir of food and strategic materials. This is the safe



area, shut off from enemy attack, and it should be developed to support the effort in the other two zones.

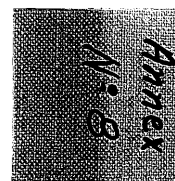
Secondly, the combined operations of land-sea-air team devised in World War II to carry short range aviation within striking distances of the enemy would be a thing of the past. Air power of global range would attack vital industries directly and at once, operating from continental home bases. The emergence of such inter-hemispheric warfare would affect not only military strategy, but also every aspect of the national life, industrial set-up, allocation of materials, deployment of manpower, nearly everything. The most important effect would be on the sources of supply of critical materials essential to the conduct of modern war.

ANNEX NO. 8

CONCLUSIONS

1. CONCLUSIONS. The United States, principal power involved in continental defense, still depends on the outside world for some strategic materials, from crude rubber and additional oil, to tungsten, tin, cobalt, and other minerals. To illustrate, the future air force will be jet-powered. Cobalt is today the key material in the manufacture of gas turbines, and 75 percent of the cobalt requirement must be imported. The same is true of chrome, so vital for high grade steel alloy production, and only 15 percent of the needed amount is found in the United States. The situation is just as acute with tungsten, tin, manganese, and other materials without which a war machine cannot function. All of these can be found and developed in Bolivia and other countries in South America.

A concrete example: It is no secret that a great deal of diplomatic and military effort has been centered by the United States in recent years on the Near East, on the assumption that Arabian oil will be available to the United States. But those oil fields are practically on the border of the Soviet Union, and therefore they are within easy striking reach not only of Stalin's strategic bombers but of his short range dive bombers and fighters as well. Within hours after the start of hostilities, the Arabian oil fields would be subjected to devastating air attack by the Soviets, and the chances of holding them would be no better than would be Russia's chances of defending oil fields in the American orbit, let us say in Mexico.



The common defense of our Hemisphere by all the nations of the Americas is no longer merely a desirable objective. Under the conditions of tomorrow's global aerial range it becomes a necessity. South America cannot survive without the kind of defenses that only industrial USA can generate. The United States, in turn, cannot fight a modern war successfully without the natural resources of South America.

The Eurasian continent is naturally self-contained. To blockade it by air or sea is a futile gesture, since it does not have to rely on outside sources of supply. Unfortunately the Americas, in spite of their great abundance and diversity of natural resources, are not yet completely self-contained.

Such is the picture of Bolivia, where every natural resource is available, particularly those which would probably become critical war materials, and yet practically everything is needed from the outside world. Our great variety of minerals, especially tin, our abundance of petroleum and rubber, they all need quite a bit of effort and capital to be developed. But the production is so much handicapped by the many difficult problems involved as previously outlined, and so much desire has our Government and people to solve these problems, and make these materials available for the benefit of the country itself, and for their use in the defense of the Hemisphere, that the immediate goal in the sphere of our economy, is to develop the production of these materials in accordance to our maximum economical capability. Towards this end, Bolivia is evidently devoting her main efforts to the development of her land. An intensive program of building operations is under way to provide the highways

and other means of transportation needed to join Bolivia's East to the West. The construction of the highway from Cochabamba to Santa Cruz is the culmination of efforts that date back many years. Two international railroads, leading from Brazil and Argentina to Bolivia's oil zone, and that will joint the Atlantic to the Pacific, (see maps E and G) are now under construction, thus providing the solution of one of the problems related with the production of oil.

Equally, the immediate goal of Bolivia, and of the three Americas as well, in the sphere of economic warfare, should lead to an intensive development of sources of strategic supplies in our Western Hemisphere, with particular emphasis in the production of oil, since the total production with the means now available would be actually insufficient to support the needs of the Armed Forces in case of war, and, unless we are certain of a continuous flow of this product, as well as of other raw materials, the defense of the Hemisphere may be dangerously, if not fatally handicapped.

ANNEX NO. 9

ACTION RECOMMENDED

1. ACTION RECOMMENDED. a. In the Hemisphere as a whole:

(1) Look to Latin America to provide products that will be drained off in the United States for indispensable war purposes.

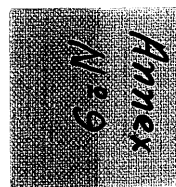
(2) A systematic appraisal and reorganization of the economic potential of North and South America should be made. An inter-American Resources Planning Board should be set up at once, embracing agricultural as well as industrial potential in its scope.

(3) Should war come in the near future, an integral mobilization planning of the industrial potential of all nations in the Hemisphere is urged. If we do not want to face this problem of defense at the last minute, it is necessary to start now to solve some of the difficulties already anticipated.

(4) Manufacture of fighter planes, guided missiles, and other defenses must be encouraged. Where necessary, Latin America manufacturing must be subsidized.

b. In Bolivia as a part of the Western Hemisphere:

(1) Since mobilization planning of the industrial potential in the Hemisphere must discount oil from the Near East, rubber, tin, and tungsten from China and the East Indies, a stockpile of these materials should be made without delay, especially those that have no substitutes. (Research on substitutes must be encouraged where and when possibilities permits.) In connection with this particular problem, nothing better

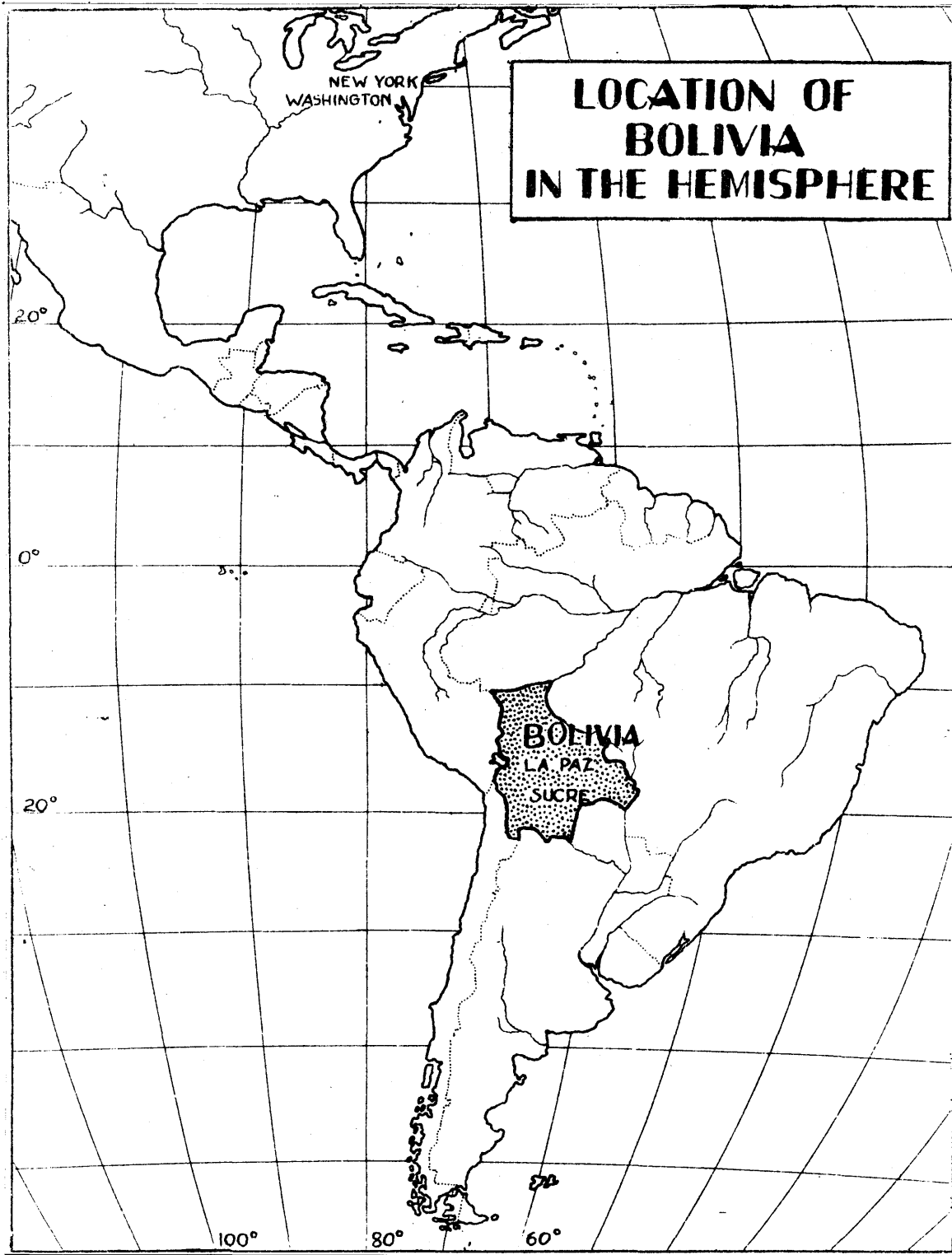


than a sound plan and its implementation for the exploitation of all these strategic materials in existence within Bolivian territory should be stepped up.

(2) As a substitute for surface transportation, Bolivian air-lift methods will grow inevitably. Therefore, Bolivian airlines must be built up. They should be helped to develop self-sustained operation by setting up depots, repair shops, and maintenance units.

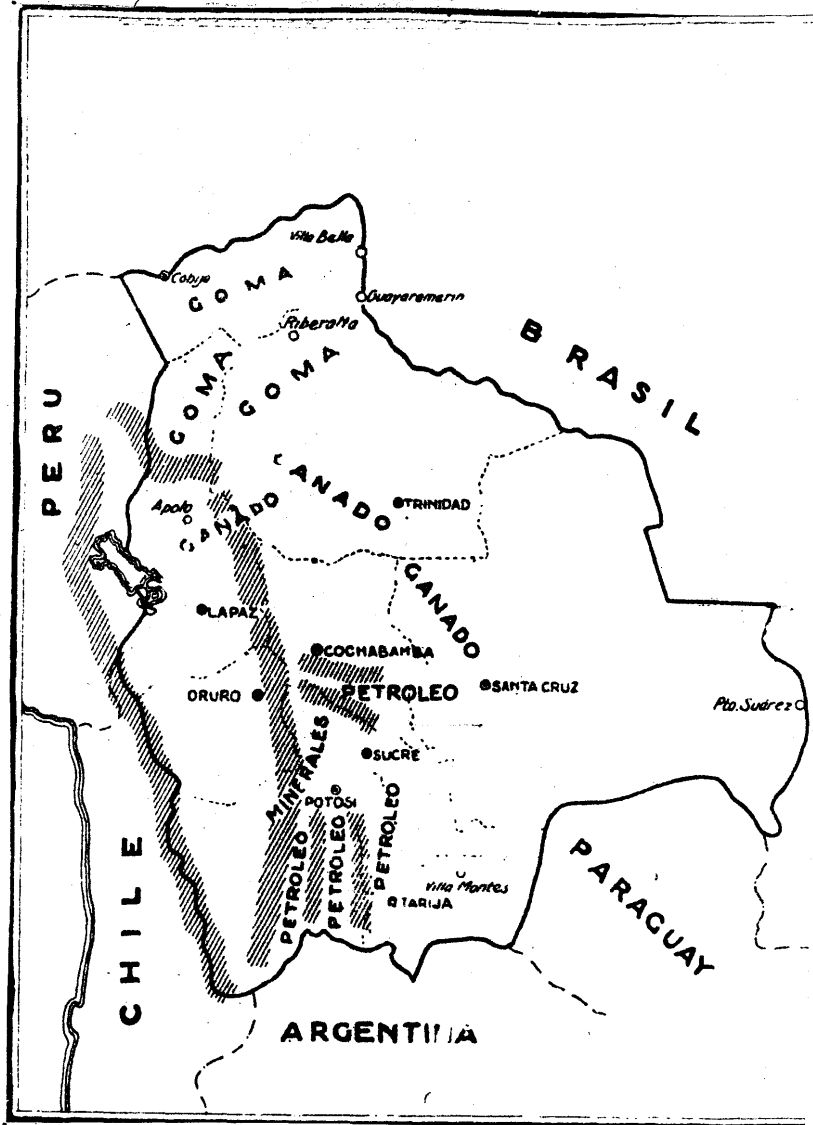
THE END

MAP A

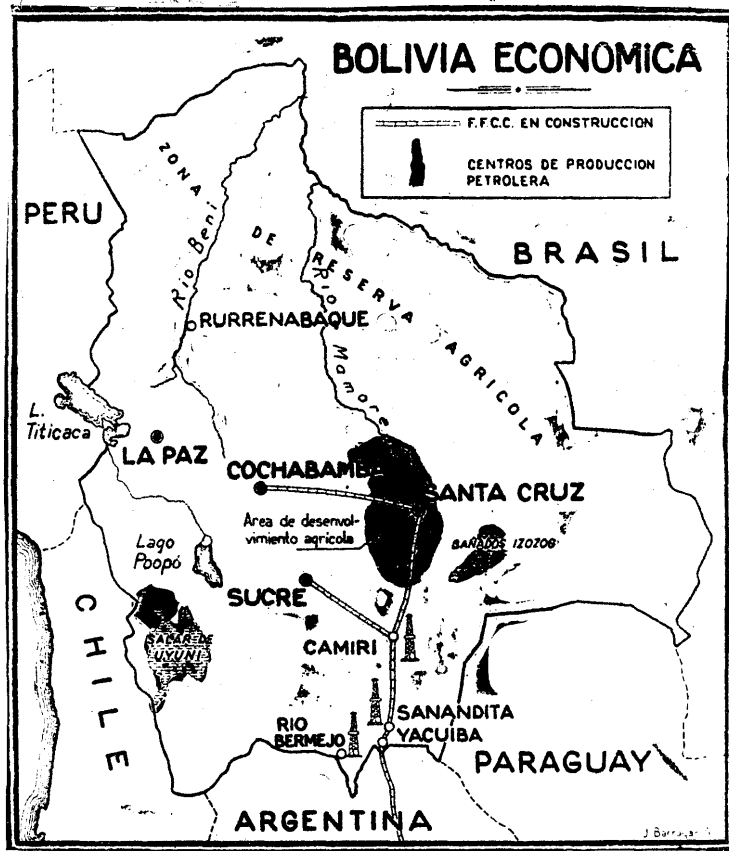


MAP B

RESOURCES OF BOLIVIA



MAP C



MAP D

