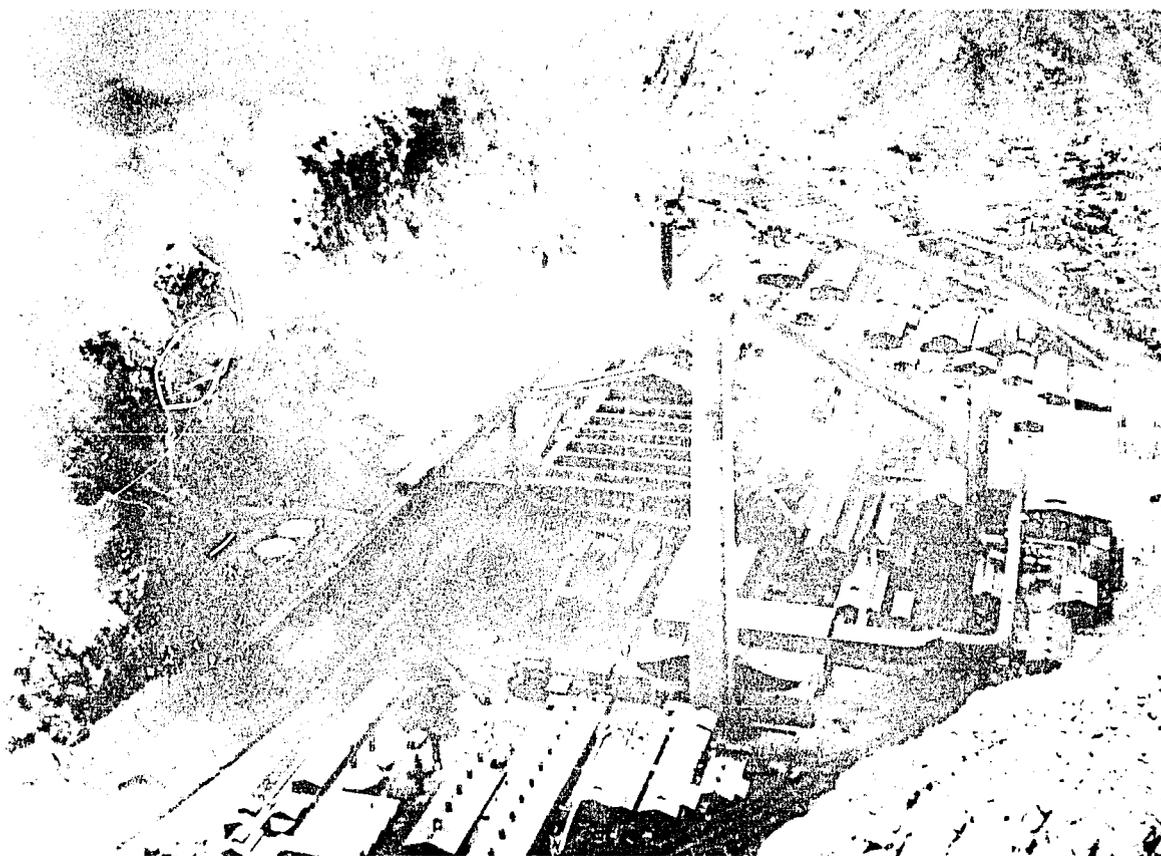


INDUSTRIAL HYGIENE PROBLEMS IN PERU



Health and Sanitation Division

THE INSTITUTE OF INTER-AMERICAN AFFAIRS

Washington 25, D.C.

A. I. D.

Reference Center
Room 1600 NS

P R E F A C E

The Health and Sanitation Division of The Institute of Inter-American Affairs makes available in this publication a report by Mr. John J. Bloomfield on his survey of the industrial environment in Perú and his recommendations for measures to protect the workers and promote their health. It is felt by the Institute that his report, though primarily for the guidance of those engaged in developing industrial hygiene activities in Perú, is at the same time a document of interest to industrial hygiene workers everywhere.

The Institute of Inter-American Affairs, an agency of the United States government, is engaged through its Health and Sanitation Division in the development of public health activities in Latin American countries. In each country the Institute and the local government carry out their joint program through a public health agency created for the purpose. In Perú, it is known as the *Servicio Cooperativo Interamericano de Salud Pública*.

The *Servicio* includes among its projects the development of workers' health programs. This activity was undertaken in the first half of 1947. Doctor Alberto Hurtado, the then Minister of Public Health and Social Welfare, had become well acquainted with such programs in the United States during his travels and studies in this country, and he asked The Institute of Inter-American Affairs to send a consultant in industrial hygiene to study the situation in Perú and make recommendations. The Institute, fortunately, was able to secure from the United States Public Health Service the loan of the services of Mr. John J. Bloomfield, Assistant Chief of the Division of Industrial Hygiene in that agency. Mr. Bloomfield has been identified with the industrial hygiene movement during its phenomenal development in the past 25 years. His mission to Perú was the second he had undertaken for The Institute of Inter-American Affairs, the first having been to Bolivia.

Mr. Bloomfield spent the period from June 17 to August 29, 1947 in Peru, working through the *Servicio Cooperativo Interamericano de Salud Pública*. In accordance with one of the recommendations in his report, the government of Perú has requested this inter-American agency to supervise the new work. Mr. Bernard D. Tebbens, industrial hygiene engineer, was assigned to Peru as Mr. Bloomfield was completing his survey. Additional personnel are being sent to aid in developing the new Industrial Hygiene Division in Perú's national government and in training personnel for the work.

This program of industrial hygiene in industrial Perú is one of the significant developments that has followed upon United States participation in public health activities in Latin America.

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INDUSTRIAL HYGIENE PROBLEMS IN PERU

**John J. Bloomfield, Sanitary Engineer Director
Assistant Chief, Industrial Hygiene Division
U. S. Public Health Service**



LETTER OF TRANSMITTAL

Washington, D. C.
December 15, 1947

Dear Mr. Sterling:

I am transmitting herewith my report on industrial hygiene problems in Perú.

I am grateful to The Institute of Inter-American Affairs for the opportunity to study health problems in Peruvian industry. During my three months in Perú, the Health and Sanitation Division's field party helped me to obtain a representative picture of industrial hygiene problems in that country. I also received excellent cooperation from the governmental agencies I visited, and particularly from the officials of the industries covered in my survey.

It is very gratifying to know that some of the recommendations contained in this report have already been put in effect. I refer particularly to the first recommendation which places the administration of the Department of Industrial Hygiene under the direction of the Servicio Cooperativo Inter-Americano de Salud Pública and asks for the assignment of qualified professional personnel from the United States to develop and guide the program in its early stages.

I should like to call special attention to Recommendation 7, which urges the establishment of a health center at Cerro de Pasco. Such a center should be able to assume leadership and assist industry toward the achievement of a general public health program. The poor health of the Peruvian worker makes this activity a prime necessity.

I should also like to suggest for your consideration the inclusion of industrial hygiene work as part of the activities of the Institute's Health and Sanitation Division in those Latin American countries which are becoming industrialized. Latin American countries should make rapid progress in general public health through the medium of industrial health programs.

Respectfully,

J. J. Bloomfield, Sanitary Engineer Director
Assistant Chief, Industrial Hygiene Division
U. S. Public Health Service

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INTRODUCTION

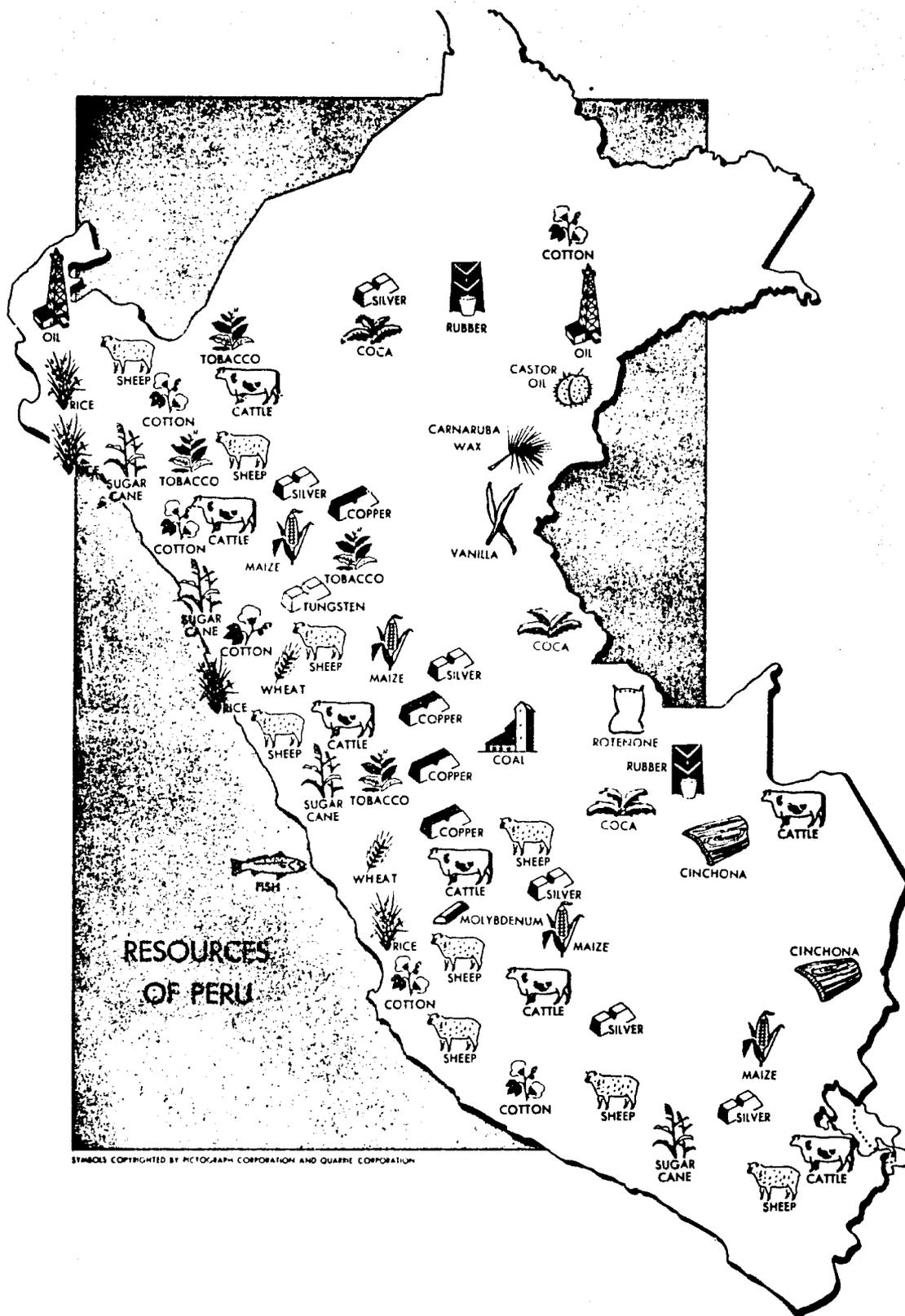
Perú's natural resources are many, and its opportunities for economic betterment are great. Although Perú is primarily an agricultural nation, its manufacturing industry is growing rapidly, and it is extremely rich in mineral resources. Until recently, Perú's topography has retarded the development of some of these resources. But in the past few years, a number of good roads have been constructed which connect the three important sections of the country and make good transportation and communication services possible on a national scale. Aviation is also playing an increasingly large role in the communication field.

Perú has been a storehouse of minerals ever since colonial days and is still an important source of oil and metals. Its coal mines, which have recently been developed, will satisfy at least its domestic needs for a long time. Iron deposits, which are now being opened, will make it possible for Perú to have steel, especially when the hydro-electric projects are completed in the Chimbote area.

These natural resources insure broad economic horizons for the country. However, in the final analysis, the population of Perú constitutes its greatest wealth. In order to exploit the natural resources of the country to the fullest, it is imperative that the standard of living of the Peruvian people be raised from its present low level. Only in this way will the productive capacity and purchasing power of the country increase.

During the last decade, Perú has enacted progressive social legislation to improve the lot of the worker. Unfortunately, much of this legislation, although well conceived, has suffered from lack of adequate implementation. Although Perú passed legislation, such as compulsory sickness insurance, old age and death benefits, and workmen's compensation for accidents and occupational diseases some time ago, the Congress did not enact any legislation for the *prevention* of industrial diseases until March of this year.

On March 12, 1947, Law No. 10833 was enacted. This law created a Department of Industrial Hygiene in the Ministry of Public Health and Social Welfare, whose function is the prevention of occupational diseases- the pneumoconioses, in particular. The law authorizes the Department of Industrial Hygiene to:



- (1) Carry on a medical and engineering control program in industry in order to minimize and eliminate occupational diseases.
- (2) Conduct research.
- (3) Carry on educational campaigns.
- (4) Promulgate rules and regulations for the control and prevention of industrial health hazards.

During the first two years of its operation, the work of the Department must be confined to six political departments: Lima, Ica, Junin, Pasco, Huanuco, and Huancavelica. Later, if the need is indicated, the Department may extend its functions to the entire country.

Financial support for the Department of Industrial Hygiene comes from a levy of 1.8 per cent on payrolls of companies employing more than 30 workers. For the present, contributions come from companies "which perform work or make use of mineral substances and soils, rocks, clays, sands, gravels, cements, as well as industrial processes related to the preparation and use of the above substances."

Soon after the law was enacted, the Minister of Health and Social Welfare in Perú asked The Institute of Inter-American Affairs, an agency of the United States government, for assistance in studying the industrial hygiene problems of the country and in organizing the new Department of Industrial Hygiene. The Institute of Inter-American Affairs, through its Health and Sanitation Division, carries on cooperative public health programs with Latin American countries. In Perú, the agency set up to represent the governments of that country and of the United States and to carry out their joint public health program is known as the *Servicio Cooperativo Interamericano de Salud Pública*. The Institute of Inter-American Affairs sent the author to Lima in June 1947 to work with this agency in carrying out the industrial hygiene activities requested by the Minister of Health and Social Welfare. Numerous references will, therefore, be made in this report to the *Servicio Cooperativo Interamericano de Salud Pública*, which is the Peruvian name for the Inter-American Cooperative Public Health Service. The report is based on observations made by the author during the period June 17 to August 29, 1947.

This report includes information on potential health and safety hazards in Peruvian industry and on the methods currently employed to deal with such hazards. It also contains information on existing legislation concerned with industrial hygiene. (A translation of the recently enacted industrial hygiene law will be found in Appendix I.) Functions of the various agencies in Perú which have some interest in or concern with industrial hygiene are

briefly described, and methods of strengthening such services are presented. For the sake of brevity, other pertinent information essential to the administration of an industrial hygiene program is not included in this report, but will be presented separately to the personnel of The Institute of Inter-American Affairs who are responsible for the program in Perú. This latter information includes rules and regulations for the control of occupational diseases; a manual for interpreting such rules; a description of the qualifications of industrial hygiene personnel; a list of the field and laboratory equipment necessary for the conduct of an industrial hygiene program; and information concerning the development of an industrial hygiene library.

Thus, an attempt has been made to define Perú's industrial hygiene problems and to present a specific program for dealing with them.



METHOD OF STUDY

It was apparent that those responsible for the enactment of the present industrial hygiene law had long been aware of the serious health hazards which exist in Peruvian industry. However, there was no one source of information which presented a well-rounded picture of these hazards. Scattered information obtained from individual studies of silicosis, lead poisoning, industrial physiology at high altitudes, and other investigations indicated an extremely high incidence of occupational diseases among workers--especially among mine workers. Therefore, before the over-all problem could be defined and a solution devised, it was necessary to obtain first-hand information.

Several methods may be employed in defining the industrial health problems of a locality. The nature and prevalence of industrial health hazards may be established either by detailed studies of workers' health and job environments, or by an analysis of occupational morbidity and mortality statistics. In order to define the problem by the first method, it is necessary to make extensive studies of the health of the workers and the working environments in various industries. This is an undertaking of no small magnitude, requiring the services of a staff of specialists in the various phases of industrial hygiene. The second method is possible only if accurate statistics on occupational morbidity and mortality are available. Since conditions in Perú precluded the use of either method, it was decided to determine the nature and extent of industrial hygiene problems by finding out the number and types of industries in the country, the number of persons employed in them, and the health hazards to which these workers are exposed.

Accordingly, a survey of a small number of representative mines and manufacturing establishments was conducted, during which special survey forms were used to record observations. In brief, the survey attempted to obtain information on operations and health hazards in the representative working establishments chosen and the control methods in use. Information was also obtained on other existing facilities for coping with these health hazards, such as medical services, safety and hygiene services, plant sanitation, and feeding facilities. Data were also obtained on labor turnover, housing conditions, schools, markets, recreation facilities, and community sanitation. Available records on occupational diseases were also obtained. (See Appendix II for forms used.)

The survey was made primarily in four regions of the country: the mining region of the central Andes; the mining region of southern Perú; the mining and petroleum area in the North; and the industrial area in Lima and its environs. Throughout the study, the author received the wholehearted cooperation of the Peruvian authorities and of management, which placed all its facilities and records at his disposal.



HEALTH PROBLEMS AMONG PERUVIAN WORKERS THE INDUSTRIAL POPULATION

THE PEOPLE

Perú is the third largest country on the South American continent and is approximately the size of Texas, New Mexico, and Arizona combined. It has an estimated population of 7,853,953. Nearly three-fourths of this population lives in the Sierra region, which comprises about one-third of the total area of the country. The racial distribution of the population is about 57 per cent Indian; 25 per cent Mestizo; 14 per cent White; two per cent Negro; and two per cent Asiatic, chiefly Japanese. When it comes to language spoken, however, the picture is somewhat different. Forty-seven per cent speak Spanish only, 35 per cent one of the Indian tongues (Quechua or Aymara), and the rest speak a mixture of Spanish and other languages.

The latest information on the size of the labor force in Perú is that based on the rather extensive 1940 census. At that time the number of gainfully employed persons totaled 2,475,339, of which nearly 1,600,000 were males. It may be seen from Table 1 that about 50 per cent of the gainfully employed were found in agriculture. Manufacturing accounted for 380,000 persons and mining for nearly 45,000.

Table 2 shows the distribution of workers in the manufacturing industries of Perú. Due to the fact that most of these industries produce light consumer goods for domestic use, a larger proportion of female workers is found in these establishments. Of the 380,000 persons in manufacturing, approximately 215,000 or 56 per cent are women. The most important manufacturing industry in Perú is the textile industry. The manufacture of clothing and its accessories is second.

Table 3 shows the number of workers employed in the various mines in the country. Of the nearly 45,000 persons employed in mines, the largest number, 7,000, are in the oil fields, with gold and copper mines coming next.

It may be seen from these data that more than a third of the population of Perú is gainfully employed. Of those employed, slightly more than a half million are engaged in industries, such as mining, milling, and manufacturing, with which major health hazards are usually associated.

TABLE I. - NUMBER OF GAINFULLY EMPLOYED PERSONS IN PERU BY MAJOR INDUSTRY GROUP			
INDUSTRY GROUP	NUMBER EMPLOYED		
	TOTAL	MALE	FEMALE
AGRICULTURE.....	1,293,214	931,468	361,746
CATTLE RAISING, FORESTRY, FISHING AND HUNTING.....	252,975	129,008	123,967
MINING AND SIMILAR INDUSTRIES.....	44,694	43,463	1,231
MANUFACTURING.....	380,281	165,516	214,765
BUILDING, CONSTRUCTIONS AND REPAIRS.....	45,659	44,782	877
TRANSPORTATION AND COMMUNICA- TION.....	51,079	48,656	2,423
COMMERCE, CREDIT AND INSURANCE.....	112,126	76,025	35,101
PUBLIC ADMINISTRATION AND OTHER SERVICES OF GENERAL INTEREST.....	89,021	72,514	16,507
INDIVIDUAL PROFESSIONS, DOMESTIC AND OTHER PERSONAL SERVICES.....	165,099	53,879	111,220
OTHER ECONOMIC FIELDS NOT CLASSIFIED.....	41,191	33,010	8,181
TOTAL.....	2,475,339	1,598,321	877,018

THEIR BACKGROUND

One of the important developments in the field of industrial hygiene during the last decade has been the realization that efforts to insure a safe and healthful working environment may be often nullified by unfavorable conditions in the home and in the community. A worker who is absent from his job because he is sick with malaria or typhus, or even a serious cold, creates as much of a production loss as if he had been disabled by an occupational disease. In the total industrial hygiene program, all causes of absenteeism are the concern of the industrial hygienist - even some which appear to be distant relatives of sickness. A worker's health has been found to be related to his income, the physical conditions under which he lives, the health of his community, and his education. All these factors must be considered, therefore, in studying the problem of industrial health.

INCOME - General standards of living in any locality are clearly related to the population's purchasing power.

The wages of a mine worker in Peru range from a minimum of 4 to a maximum of 10 soles per day and average about 6.50 soles a day. In most factories, wages are somewhat higher, starting with a mini-

TABLE 2. - NUMBER OF PERSONS EMPLOYED IN THE MANUFACTURING INDUSTRIES IN PERU			
TYPE OF INDUSTRY	NUMBER EMPLOYED		
	TOTAL	MALE	FEMALE
TEXTILE.....	190,910	32,369	158,541
LEATHER.....	4,941	4,427	514
LUMBER.....	24,182	23,632	550
METALS.....	14,788	14,384	404
CERAMIC AND OTHER NON-METALLIC INDUSTRIES.....	11,712	8,674	3,038
CHEMICAL.....	3,108	2,434	674
PAPER.....	643	482	161
TOBACCO.....	419	251	168
FOOD.....	22,158	17,522	4,636
BEVERAGES AND DISTILLERIES.....	5,830	3,935	1,895
CLOTHING AND ACCESSORIES.....	90,039	46,954	43,085
PRODUCTION AND DISTRIBUTION OF ELECTRICITY.....	2,493	2,352	141
PRINTING, BINDING AND PHOTOGRAPHY.....	4,962	4,504	458
INSTRUMENTS, WATCHES AND JEWELRY.....	2,649	2,479	170
MISCELLANEOUS MANUFACTURING INDUSTRIES.....	1,447	1,117	330
TOTAL.....	380,281	165,516	214,765

TABLE 3. - NUMBER OF PERSONS EMPLOYED IN MINING INDUSTRIES IN PERU	
TYPE OF MINE	NUMBER OF WORKERS
GOLD.....	6,973
SILVER.....	3,522
COPPER.....	5,101
LEAD.....	1,800
VANADIUM.....	419
COAL (PIT, LIGNITE, ANTHRACITE, ETC.).....	896
MOLIBDENUM AND TUNGSTEN.....	554
ZINC AND OTHER.....	181
OIL FIELDS.....	7,111
SALT.....	819
GUANO.....	1,546
PLACER MINING.....	2,809
UNCLASSIFIED MINES, DEPOSITS AND PLACERS.....	12,960
TOTAL.....	44,694

mum of 2.50 soles for beginners and going as high as 14 soles a day in some of the large factories in Lima. Average pay is about 8 soles per day.

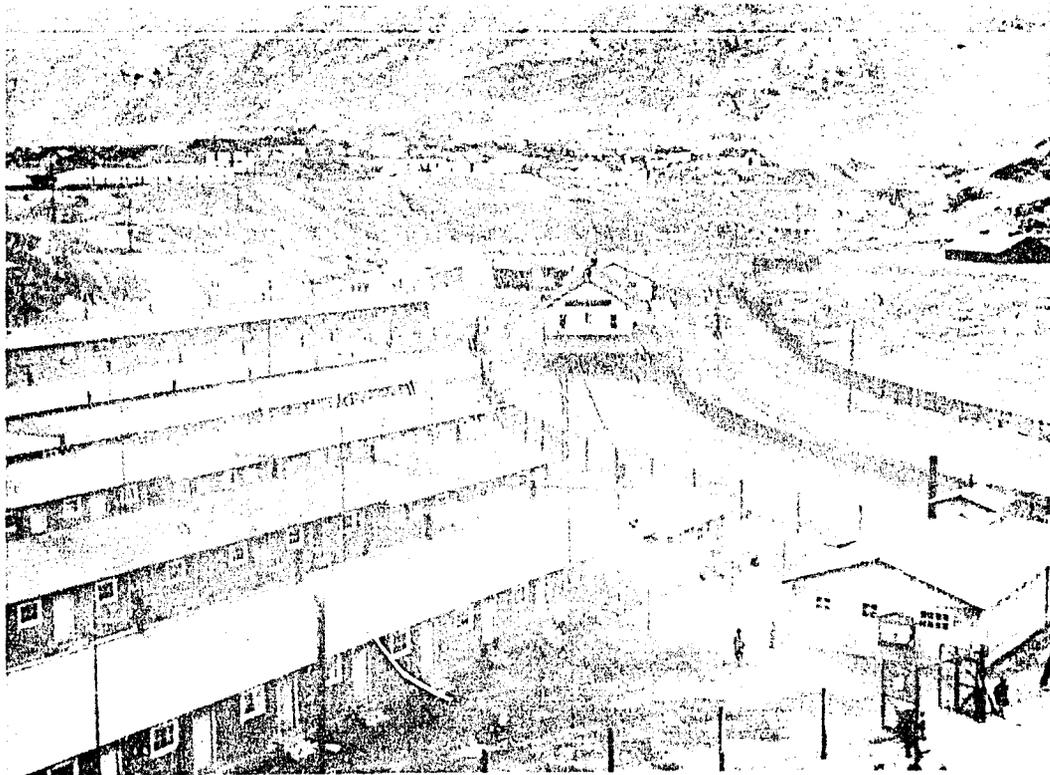
On the whole, miners are better off than factory workers, in that they have employer-provided "benefits." For example, in addition to housing, medical care, and schools, which will be discussed later, mine workers and their families may purchase the necessities of life in company-operated stores. Most of these stores are operated by the company and sell goods at cost, but some of the larger stores actually supply goods to the workers at a slight loss. In one large company store, the prices of some eight essential food items were at least 20 per cent lower than in other stores in the community. In Perú, as in other South American countries, this practice creates a problem, since employees resell goods they buy to obtain extra funds. As a rule, private merchants charge reasonable prices, except when company stores run out of goods. At that time, private stores raise prices for goods in short supply. Table 4 shows prices charged by private stores and a company store in one mining area.

TABLE 4. - COMPARISON OF PRICES BETWEEN A COMPANY MANAGED STORE AND PRIVATE STORES		
ITEM	PRICES IN SOLES	
	COMPANY MANAGED	PRIVATE
SPAGHETTI PER KILO.....	1.00	1.80
PORK PER KILO.....	5.20	8.00
SHOES PER PAIR.....	27.80	39.00
SUGAR PER KILO.....	0.32	0.40
CLOTH MATERIALS PER METRE.....	1.60	3.50
MEAT PER KILO.....	1.00	2.20
OATS PER KILO.....	1.60	2.20
BREAD PER 84 GRMS.....	0.05	-
PER 40 GRMS.....	-	0.05

Company-provided benefits, such as cheap food, housing facilities, free primary schools, and recreational facilities, are of some value to mine workers. However, even with these additional benefits, the remuneration to the mine workers scarcely provides a desirable standard of living, even taking into account the relative standards of the workers in other industries.

Perú has been hit by inflation, which has further aggravated this situation.

HOUSING AND LIVING CONDITIONS - Housing in Perú is in acutely short supply. Especially in mining communities, houses are drab, overcrowded, insanitary, and frequently lack even the most elementary sanitary facilities. Such conditions are also true in certain areas of Lima. Detailed information on community facilities available to workers in establishments surveyed is presented in Table 5.



Workers' houses at a smelter.

Many of the miners' homes are of the adobe type or built out of cinder blocks. Usually, houses are constructed in a series of 20 or more to a unit or block. The houses vary from one room to as many as three and sometimes four rooms. The latter, however, are usually reserved for white collar workers, or *empleados*, and a nominal charge is made for them. At one large establishment two-room houses rented for 3.75 soles a month, three-room houses for 7.50, and the four-room variety for 12.50. Nearly three out of four houses in many of the camps are of the one-room variety. As a consequence, crowding is a terrific problem. It is not uncommon to find four to eight persons living in one room, which also serves as a kitchen, dining room, and bedroom. For example, in one community where 2,600 workers are employed, there are 1,650 houses. In another large mining camp employing nearly 3,000, only 450 houses are available.

TABLE 5. - COMMUNITY FACILITIES AVAILABLE TO WORKERS IN ESTABLISHMENTS SURVEYED.

PLANT NO.	TYPE OF INDUSTRY	NUMBER OF WORKERS	HOUSING CONDITIONS					GARBAGE COLLECTION	SCHOOLS	COMMUNITY STORES		REMARKS
			GENERAL	SANITARY FACILITIES						OPERATED BY	TYPE	
				WATER	SEWAGE	TOILETS	COMMUNAL 1/ FACILITIES					
1	METAL MINE.....	250	VERY POOR; ADOBE HUTS; CROWDED	SPIGOTS OUTSIDE	OPEN DITCH	LATRINE	X	-	CO. 2 GRADES	CO.	MERCANTILE; MEAT; VEG.	
2	METAL MINE AND MILL.....	3,000	POOR; CROWDED	SPIGOTS OUTSIDE	PRIVATE SYSTEM	PRIVY	X	-	CO. 3 GRADES, 2 ROOMS	CO.	GENERAL	NEW HOUSES BEING BUILT.
3	COPPER MINE AND MILL.....	650	CROWDED	SPIGOTS OUTSIDE	OPEN DITCH	LATRINE	X	DAILY	CO. 5 GRADES	CO.	MERCANTILE	
4	METAL MINE AND MILL.....	707	FAIR	SPIGOTS OUTSIDE	NONE	PRIVY OVER RIVER	X	-	CO. 4 GRADES (CLEAR)	CO.	MERCANTILE	
5	METAL MINE AND MILL.....	626	POOR; CROWDED	SPIGOTS OUTSIDE	OPEN DITCH	LATRINE	X	-	CO. BUILT; GOV'T. OPERATED	CO.	MERCANTILE MEAT	
6	METAL MINE AND MILL.....	1,487	VERY BAD; CROWDED	SPIGOTS OUTSIDE	OPEN DITCH	LATRINE	X	-	CO. 8 GRADES	CO.	GENERAL; MEAT; VEG.	
7	METAL MINE AND MILL.....	500	ADOBE; OLD; CROWDED	SPIGOTS OUTSIDE	OPEN DITCH	NONE	X	-	CO. 6 GRADES	CO.	MERCANTILE	
8	VANADIUM MILL.....	750	POOR; CROWDED	SPIGOTS OUTSIDE	OPEN DITCH	PRIVY	X	-	CO. 8 GRADES, 2 ROOMS	CO.	GENERAL	ALL FACILITIES IN-ADEQUATE. ISOLATED CAMP. NEW HOUSES AND SCHOOL BEING BUILT.
9	GOLD MINE AND MILL.....	850	BAD; VERY CROWDED	SPIGOTS OUTSIDE	NONE	LATRINE	-	-	CO. 6 GRADES, (FAIR)	PRIVATE 2/	MERCANTILE	BAD AND INSANITARY CAMP. MALARIA SOURCES.
10	METAL SMELTER.....	3,150	POOR; CROWDED	SPIGOTS OUTSIDE	OPEN	NONE	1	-	CO. GRADE	CO.	MERCANTILE; MEAT; VEG.	
11	COAL MINE.....	1,900	GOOD; CLEAN	SPIGOTS OUTSIDE	OPEN	STRADDLE	X (CLEAR)	-	CO. 5 GRADES	CO.	MERCANTILE	NEW HOMES AND RECREATION FACILITIES BEING BUILT.
12	COAL MINE AND WASHER.....	500	POOR; CROWDED; FILTHY	SPIGOTS OUTSIDE	NONE	LATRINE	X	-	CO. 3 GRADES	PRIVATE 2/	MERCANTILE	DUSTY AND INSANITARY CAMP. INHABITANTS' FACES BLACK.
13	COAL WASHER.....	150	POOR; ADOBE; CROWDED	SPIGOTS OUTSIDE	OPEN STREAM	NONE	X	-	CO. GRADE	CO.	GENERAL	
14	OIL AND GASOLINE PRODUCTION.....	5,000	POOR; CROWDED; FILTHY	SPIGOTS OUTSIDE	PRIVATE SYSTEM	LATRINE	X	X	CO. 6 GRADES (GOOD)	CO. AND PRIVATE	ALL TYPES	BUILDING NEW TOWN. OLD SITE INSANITARY AND POORLY MAINTAINED.
15	DAM AND TUNNEL CONSTRUCTION.....	1,060	GOOD	SPIGOTS OUTSIDE	PRIVATE SYSTEM	PRIVY	X	X	CO. 5 GRADES	CO.	GENERAL	
16	R.R. AND POWER PLANT CONSTRUCTION.....	350		WORKERS LIVE IN TOWN								
17	WOOL CLOTH MILL.....	984		WORKERS LIVE IN TOWN					TOWN CO. PAYS TUITION	CO.	MERCANTILE	
18	CEMENT PRODUCTION.....	809	FAIR; CROWDED	SPIGOTS OUTSIDE	SEPTIC TANK	FLUSH	X	-	CO. GRADE	CO.	GENERAL	WILL PROVIDE BETTER HOUSING.
19	ASBESTOS BLDG. MATERIAL.....	180		WORKERS LIVE IN TOWN								PLANT HAS AUDITORIUM, LIBRARY, CLASSES IN HYGIENE.
20	REFRACTORY BRICKS, CHINA-WARE.....	262		WORKERS LIVE IN TOWN								
21	GLASS BOTTLES.....	170		WORKERS LIVE IN TOWN								

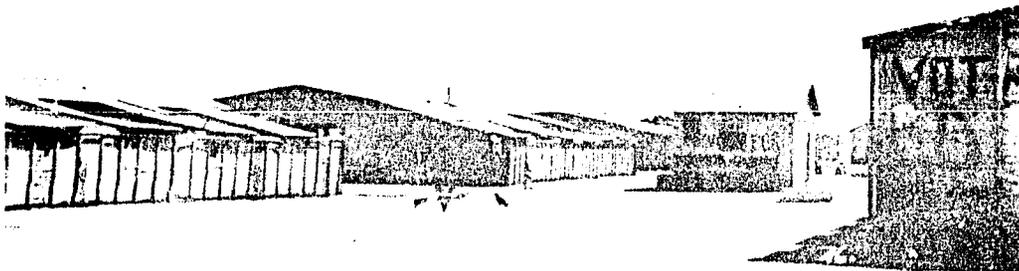
1/ Refers to common areas for baths, toilets, and laundry facilities.

2/ Company controls prices.



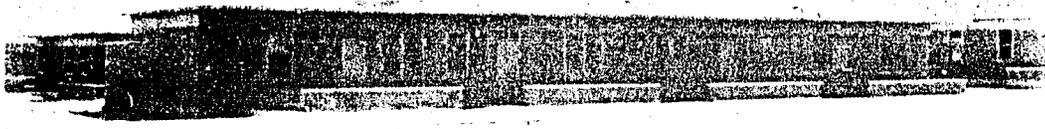
Old type of workers' houses in one of the establishments surveyed.

Water is obtained from spigots at each end of a block of houses. Toilets, as well as laundry and shower facilities, are usually of the communal type. Waste water runs into uncovered troughs in outside ditches, which are also used for garbage and sewage. As far as can be determined, none of the water supplies are approved. No means of treating human wastes are available, and in most cases they flow into nearby streams. In only a few instances are facilities available for garbage removal. Carrion and fly-infested garbage litters the backs of houses and the streets.



Rear of old type of workers' houses showing communal baths and toilets.

There is no denying that by comparison with some of the privately owned huts of some of the workers most company houses are a great improvement. In many, but not all, of the larger mining communities, animals are not allowed around the houses in the camps. In all the privately owned homes, the workers allow their pigs, goats, and hens to roam where they will. At present, very few miners own their own homes. It is understood that most of them would like to own their own homes, so that they might have gardens, keep their animals, and gain a sense of home and stability, which they do not have now. The problem of labor turnover, which will be discussed later, is influenced to some extent by this lack of stability. It is felt that industrial establishments should en-



New type of workers' houses replacing old type shown.

ourage workers to have their own homes and assist as much as possible to achieve this objective. The reason which many firms now give for failing to encourage home ownership is that the workers would not keep them in good condition. This is not a very valid reason, since a company's responsibility, as well as that of the Government itself, should not end with the provision of the means and the opportunity for owning a home. It should go beyond that and include an educational program to teach the workers how to live in a sanitary and healthful fashion.

Most of the larger concerns are fully aware of the housing problem and are attempting to build additional housing. Unfortunately, with the single exception of one large petroleum company, which has a very ambitious modern housing program, the companies are making the same mistakes in their new housing projects as they did in their old ones. Many of the townsites are selected

with no regard for health and sanitation requirements, and the houses still lack elementary sanitary facilities. The workers' houses being built by the petroleum company are an exception to the rule. They are models in construction and sanitation and will be conducive to good health and well being.

In summary, therefore, it may be said that housing and living conditions in Peruvian industrial communities, especially in the mining areas, are inadequate in quality and insufficient in quantity. A vigorous housing program on the part of the Government and the industries concerned is needed. Concurrently with such a program, workers and their families should get the benefit of a vigour-



Typical view of new type of workers' houses, showing front and rear aspects.

ous educational program on healthful living. Living conditions as they exist now are potential sources of ill health and cause rapid deterioration of present housing as well.

COMMUNITY HEALTH AND SANITATION - Development of Perú's rich natural resources is inhibited by disease, control of which is in turn limited by lack of funds and trained personnel. It is well known that there is a scarcity of doctors, nurses, and hospitals, especially in the rural areas. Most of the trained professional workers and facilities are located in Lima. In 1947, Perú appropriated approximately \$4,800,000 (U.S.) for public health, or about 60 cents per capita. In some countries, the per capita rate is higher, running in one instance to more than \$2.00 per year for State health work.

Water supply systems are often unsafe, especially in the min-

ing communities. It is only within the last few months that the Ministry of Public Health and Social Welfare has been given responsibility for the administration of water supply. This function will be carried out by the Department of Sanitary Engineering, which at the moment has only seven trained sanitary engineers.

Few sewage treatment plants exist in Perú. Several of the large cities have sewers, but no treatment facilities. Incidence of tuberculosis is known to be very high in Perú and is one of the major communicable disease problems of the country. Although rates are not available for most of the communicable diseases, some idea of the health problems of the country may be gleaned from the experience of 1946. In that year, 123,490 cases of infectious diseases were reported to the Ministry of Health. Of these, 57,883 were malaria; 18,671, tuberculosis; 12,295, whooping cough; and 6,931, dysentery.

Proportional mortality is available for 1945. These data show that of all deaths reported tuberculosis accounted for 6.2 per cent; pneumonia, 1.4 per cent; grippe, 8.1 per cent; and other respiratory diseases, 12.9 per cent. In other words, respiratory diseases accounted for 28.6 per cent of all deaths in Perú during 1945.

The administration of public health in Perú is largely a centralized function of the Ministry of Health and Social Welfare. With the exception of the work carried on by the Peruvian Government in cooperation with The Institute of Inter-American Affairs in a few restricted areas, departmental, provincial, or local public health work is not undertaken in Perú. Although mining companies are obliged by law to provide camps, schools, and sanitation services, such as water and sewage disposal, not until this year has there been any successful leadership in assisting industry to improve public health conditions in industrial areas.

EDUCATION - Closely related to poor health, poor housing and low wages are such social problems as illiteracy. Perhaps the greatest educational problem in Perú is the incorporation of the Indian into the nation's life and society. Native Indian languages are spoken by a great majority of the people. Indian culture and tradition affect and influence every aspect of Peruvian life, including industry.

According to the 1940 census, only 42 per cent of the population was literate. The rate of literacy varied from approximately 93 per cent in Callao to only 12.6 per cent in Apurimac. In the Sierra, where most of the mining communities are located, the percentage of literacy was lowest, because of the large Indian population there and the lack of adequate educational facilities. According to law, mining companies in whose communities more than

30 children live are required to maintain schools. The company is required to build and maintain the school building and pay the salaries of the teachers, who are appointed by the Government. The equivalent of at least the first four grades must be taught in these schools. Special literacy schools are also supposed to be provided for adults whenever 20 persons make known their wish to study.

Most of the schools visited during this survey were overcrowded and lacked materials and equipment. A few of these schools did not go beyond the second grade of instruction. Various studies reveal that primary education is available to only a very small fraction of the population. As already mentioned, many schools lack rudimentary facilities, such as chairs, desks, books, blackboards, and chalk. Many of those visited lack proper sanitary facilities and fresh air. Obviously, the lack of ventilation and the unhygienic state of the pupils are not conducive to either good health or comfort.

Hygiene is generally unknown to the Indians, so that health education is a major and urgent necessity. However, it is impossible to bring such education to large groups of people who cannot read and who do not even speak the same language as the teachers.

It is obvious, therefore, that the lack of adequate school facilities and instruction all operate against building a strong and healthy race. Education plays an important role in determining the health and productivity of the working population.

Although the foregoing sketch of the background of the industrial population has been rather brief, it is necessary to have some idea of these important factors which relate to the workers' health. No good industrial hygiene program can ignore the important roles such socio-economic problems play in the industrial picture. Against this background, the added health problems which have their origin in the working environment must be studied and solved.

HEALTH IN INDUSTRY

Although it was impossible to make detailed studies of the health of the workers or of the conditions under which they labored, sufficient information was obtained about working environments and industrial health services to get a good idea of occupational hazards and measures taken to correct them.

INDUSTRIES SURVEYED

Twenty-one representative mining and manufacturing establish-

ments in Perú were surveyed to obtain first-hand information on health hazards and facilities for coping with them. Statistics on occupational diseases and some figures on accidents were obtained from individual concerns, where these were available. These helped to define the problem on a quantitative basis. In general, the information gathered pertains to hazards in the working environment and their control; compensation and sickness benefits; medical services, including dentistry and nursing; safety precautions; disability records; feeding facilities; and general sanitation, such as water supply, sewage disposal, toilet facilities, and locker rooms.

The 21 mines and factories visited employed 22,935 workers. Of these 21 plants, five were manufacturing (a glass bottle works, a cement mill, a refractory brick and chinaware plant, an asbestos and cement building material plant, and a woolen mill); 13 were mines including a tunneling job for the hydro-electric project, a petroleum operation, a hydro-electric construction project, a smelter, and a coal washer. All the mines which produced metallic ores had concentrators. Of the 11 mines actually producing ore and concentrate, one was a gold mine; two produced coal; one, vanadium ore; and the balance, a mixture of copper, lead, zinc, and silver. Only 2,405 of the 22,935 employees surveyed were employed in the manufacturing establishments.

Even though the number of workers and plants in the industries surveyed appears to be small in relation to the total number of establishments and workers in Perú, the plants selected were sufficiently representative of Peruvian industry to allow the drawing of valid conclusions.

The extent to which various medical, safety, sanitation, and welfare facilities were available to the workers in the 21 industries surveyed is summarized in Tables 6 and 7. Detailed findings and observations for individual plants are shown in Tables 8, 9, and 10. The last three tables are included in order to point out the close relationship between the health and welfare of workers and their working and living conditions.

OCCUPATIONAL HAZARDS

Health and safety consciousness was not very high among management and workers in most of the mines and factories visited during this survey. Working conditions described in this report are a reflection of this attitude and are presented in detailed form in Table 8.

MINES - The chief health hazard in the mines visited was exposure to silica dust released during drilling, loading, and trans-

portation operations. Because some of the ores were sulfide in character, a few mines also had high concentrations of sulfur dioxide gas. In a few mines, high humidities and temperatures were also encountered.

The most serious of these hazards was the exposure to silica dust, which confirmed the high rate of silicosis among Peruvian miners. At present, no data are available as to the amount of free silica in the various ores, nor have any dust studies ever been made in Peruvian mines. However, some information is available to indicate that free silica is present in the ores and, in some instances, in high concentrations. In many of the mines, it was not necessary to make dust determinations to know that miners were breathing high concentrations of dust, since the amount of dust created in some of the mines was great enough to be visible to the naked eye.

Drilling was one of the mining operations which produced great amounts of dust. Most of the drilling was accomplished with compressed air, and, although drilling was supposed to be done wet, dry methods were frequently encountered. Invariably, the collaring of holes was done dry. In most instances, where wet methods were employed, it was apparent that an insufficient amount of water was fed to the hollow drill. The one gold mine visited, which was said to be typical of mines in the Southern area, was particularly dusty, since sufficient water was usually unavailable. In fact, the water used underground was brought to the mine in tins attached to ore buckets hauled over an eight kilometer aerial cable.

Dust was released in many of the mines during rock removal and during transfer, but by far the largest amount of dust was produced during mucking or loading operations. A great deal of dust was also produced when ore was transferred from raises and ore chutes to cars. When mechanical methods were used in mucking dry ore, such as in scraping operations, the dust was excessive.

With but one or two exceptions, mechanical ventilation was not employed in Peruvian mines. When mechanical ventilation was provided, it was obviously insufficient in quantity, and in one case it was completely ineffective because the system was not operating at the time of the visit. Natural ventilation was the rule and this was insufficient. Even when wet methods were employed, workers were still exposed to clouds of dust. Automatic air and water throttles were non-existent, so that it was practically impossible to prevent dry collaring. Mine operators did not know how much water was fed to the drills, although scientific studies have indicated the exact amount of water needed for various types of drills and drill speeds. Blasting, which produced tremendous quantities of dust, took place during the lunch hour in all mines. There was not enough time between the noon-hour blasting and the miners' return to work for all the dust to disperse by natural

TABLE 6. - AVAILABILITY OF MEDICAL AND SAFETY PROVISIONS AND SERVICES IN ALL PLANTS SURVEYED.

PROVISION OR SERVICE	PERCENT OF WORKERS TO WHOM SERVICE IS AVAILABLE			NUMBER OF ESTABLISHMENTS PROVIDING SERVICE ^{1/}		
	ALL ESTABLISHMENTS	MINING, SMELTING, CONSTRUCTION	MANUFACTURING	ALL ESTABLISHMENTS	MINING, SMELTING, CONSTRUCTION	MANUFACTURING
ESTABLISHMENTS SURVEYED.....				21	16	5
WORKERS INCLUDED.....	22,935	20,530	2,405			
HOSPITAL: COMPANY OWNED.....	87.	98.	-	14	14	-
OTHER ARRANGEMENT.....	6.	2.	45.	3	1	2
FIRST-AID ROOM.....	98.	98.	100.	20	15	5
FIRST-AID KIT.....	100.	100.	100.	21	16	5
TRAINED FIRST-AID WORKER.....	96.	96.	93.	18	14	4
PHYSICIAN: FULL-TIME.....	87.	98.	-	14 ^{2/}	14	-
PART-TIME.....	10.	-	93.	4	-	4
ON CALL.....	3.	2.	7.	3	2	1
NURSES: FULL-TIME.....	92.	98.	41.	16 ^{3/}	15	1
DENTIST: FULL-TIME.....	55.	62.	-	4	4	-
PART-TIME.....	9.	10.	-	4	4	-
ON CALL.....	8.	7.	18.	4	2	2
PHYSICAL EXAMINATIONS: PREPLACEMENT..	97.	98.	93.	19	15	4
PERIODIC.....	39.	41.	18.	5	3	2
X-RAY INCLUDED	24.	27.	-	2	2	-
MEDICAL CARE PROVIDED FAMILIES OF WORKERS.....	62.	69.	-	6	6	-
HEALTH AND SAFETY COMMITTEE.....	-	-	-	-	-	-
ENVIRONMENTAL HYGIENE PROGRAM.....	2.	-	18.	2	-	2
SICKNESS BENEFITS SUPPLEMENTED BY:						
MANAGEMENT.....	91.	96.	66.	19	15	4
MANAGEMENT AND UNION.....	4.	-	34.	1	-	1
RECORDS KEPT: ACCIDENTS.....	76.	82.	25.	17	14	3
OCCUPATIONAL ILLNESS...	76.	82.	25.	17	14	3
NONOCCUPATIONAL ILLNESS	79.	82.	59.	18	14	4
SAFETY DIRECTOR: FULL-TIME.....	55.	60.	7.	8	7	1
PART-TIME.....	15.	17.	-	4	4	-
SHOP COMMITTEE.....	-	-	-	-	-	-

^{1/} Percent not computed because of small numbers.

^{2/} Total of 35 physicians employed.

^{3/} Total of 66 nurses employed, including practical.

TABLE 7. - AVAILABILITY OF SANITATION PROVISIONS IN ALL PLANTS SURVEYED.

PROVISION	PERCENT OF WORKERS TO WHOM PROVISION IS AVAILABLE			NUMBER OF ESTABLISHMENTS PROVIDING PROVISION		
	ALL ESTABLISHMENTS	MINING, SMELTING, CONSTRUCTION	MANUFACTURING	ALL ESTABLISHMENTS	MINING, SMELTING, CONSTRUCTION	MANUFACTURING
ESTABLISHMENTS SURVEYED.....				21	16	5
WORKERS INCLUDED.....	22,935	20,530	2,405			
WATER SUPPLY: PUBLIC.....	9.	4.	48.	4	2	2
PRIVATE.....	91.	96.	52.	17	14	3
SEWAGE DISPOSAL: PUBLIC.....	4.	2.	18.	3	1	2
PRIVATE.....	48.	44.	82.	6	3	3
OPEN DITCH OR NONE.....	48.	54.	-	12	12	-
DRINKING FACILITIES: FOUNTAIN.....	44.	47.	15.	8	6	2
SPIGOT.....	18.	11.	75.	5	3	2
BUCKETS, CARBOYS.....	23.	24.	11.	3	2	1
NONE.....	15.	16.	-	7 ^{1/}	7 ^{1/}	-
WASHING FACILITIES: BASIN, SPIGOT.....	43.	42.	55.	7	4	3
SHOWER.....	56.	56.	55.	7	4	3
COLD WATER.....	37.	34.	66.	8	4	4
HOT AND COLD WATER	22.	25.	-	2	2	-
INDIVIDUAL TOWEL						
AND SOAP.....	2.	-	15.	2	-	2
NONE.....	41.	42.	34.	13 ^{1/}	12 ^{1/}	1
TOILET FACILITIES: FLUSH.....	30.	26.	59.	6	2	4
PRIVY, LATRINE,						
DITCH, CANS.....	64.	67.	41.	15	14	1
NONE (mine).....	6.	7.	-	1	1	-
LOCKERS PROVIDED.....	6.	5.	15.	3	1	2
FEEDING FACILITIES AT WORKPLACE:						
SPACE PROVIDED: ENTIRE PLANT.....	24.	25.	15.	4	2	2
MINE ^{2/}	13.	14.	-	4	4	-
SPACE NOT PROVIDED: ENTIRE PLANT.....	28.	26.	45.	4	2	2
MINE ^{2/}	4.	4.	-	3	3	-
WORKERS EAT HOME: ENTIRE PLANT.....	15.	12.	41.	7	6	1
MILL ^{2/}	16.	17.	-	7	7	-
DINING ROOM PROVIDED (single men)	1.	1.	-	1	1	-

^{1/} Includes 2 establishments where underground workers are not provided facilities.

^{2/} Applies to establishments consisting of mine and concentrating mill where facilities differ for underground workers.

ventilation. All of these factors were conducive to the inhalation of excessive amounts of silica dust, and the resultant rapid development of silicosis.

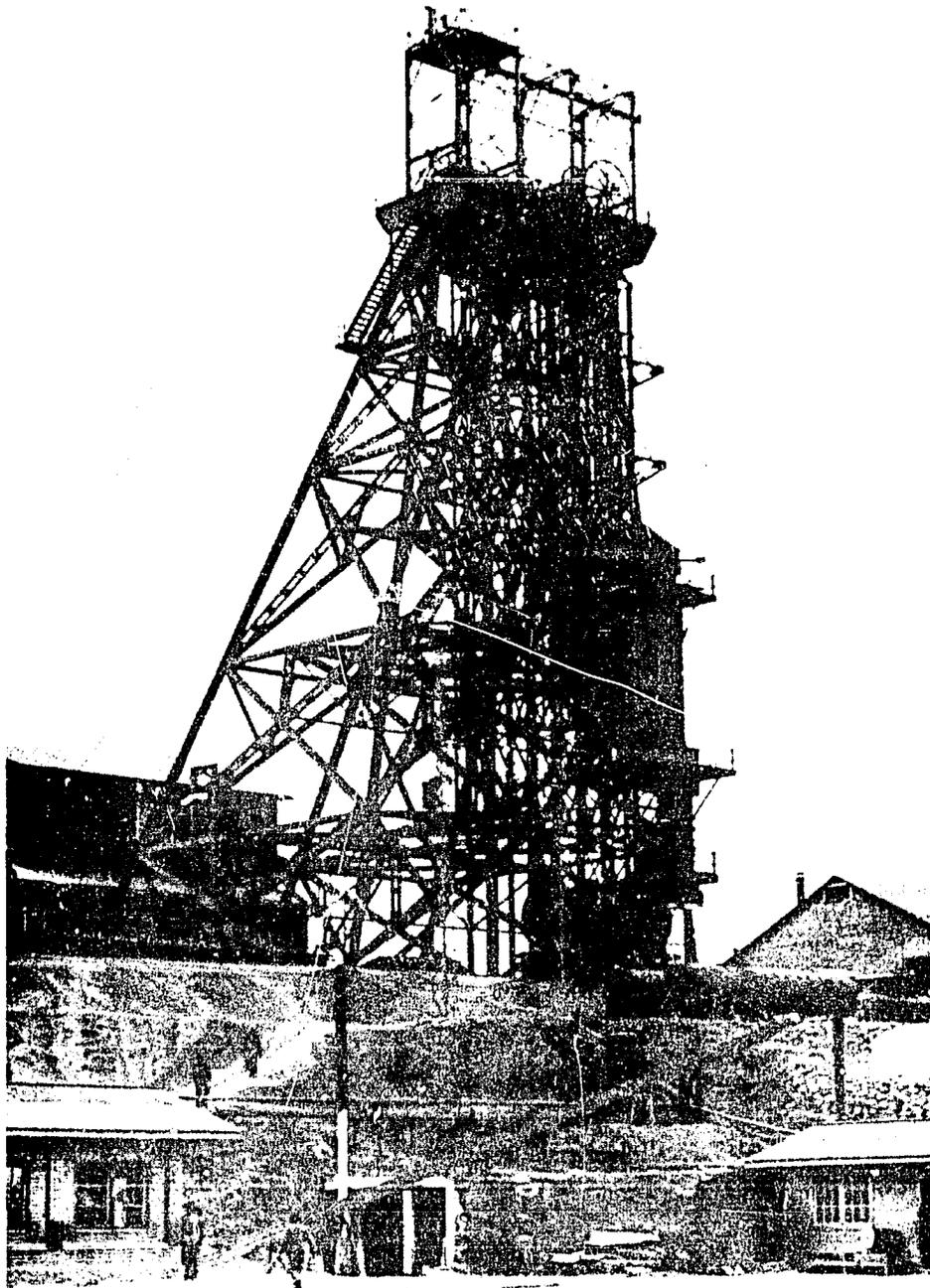
It may be of interest to note in passing that in the fall of 1945 the *Sociedad Nacional de Minería* of Perú invited an eminent ventilation engineer of the Ontario Mining Association of Canada to study representative mines and mills in Perú and to make recommendations for the prevention of silicosis. The author of this report surveyed ten of the mines and mills that had been visited by the Canadian engineer. In spite of excellent recommendations made by the Canadian concerning the prevention of silicosis, the author



Concentrating mill at a copper mine.

found that conditions in these ten mines were about the same as they had been when that engineer visited them nearly two years earlier.

Most of the mills where ore was concentrated were in as poor condition as the mines underground. Dumping and crushing of ore was done with very few enclosures and no exhaust ventilation. On the whole, it may be said without challenge that management in Peruvian mines has paid very little attention to the control of dust at its sources, whether it be above or below ground. Although hundreds of thousands of dollars are now being paid out in compen-



Shaft in a copper mine.

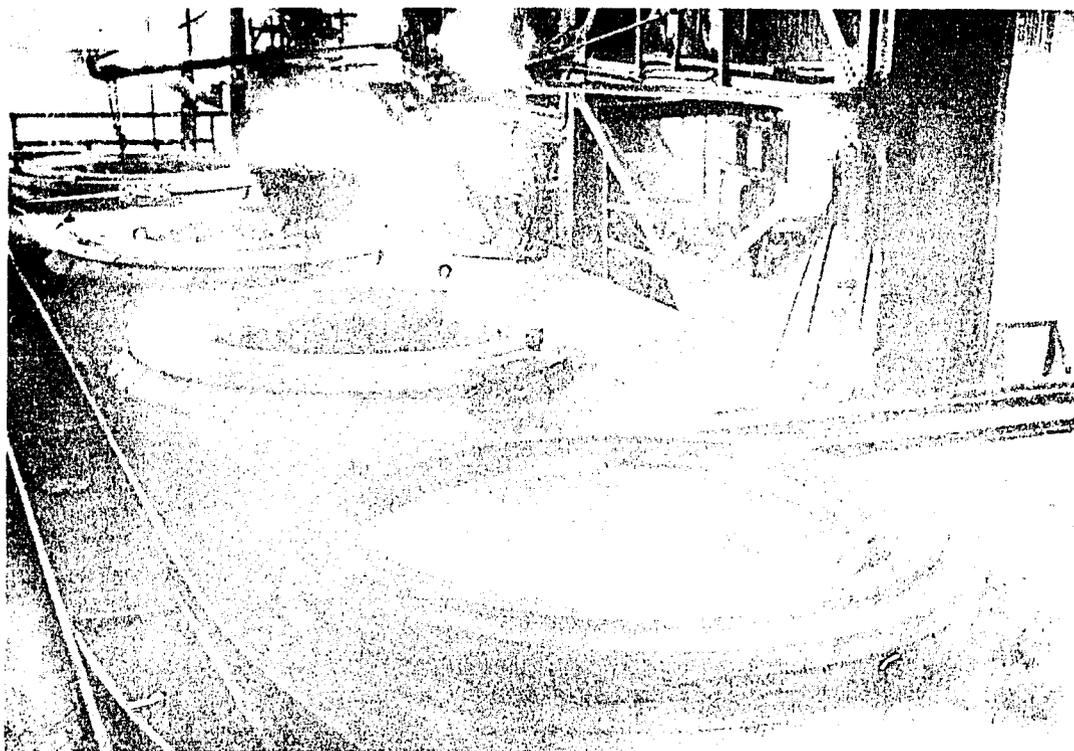


Dry drilling in a coal mine.

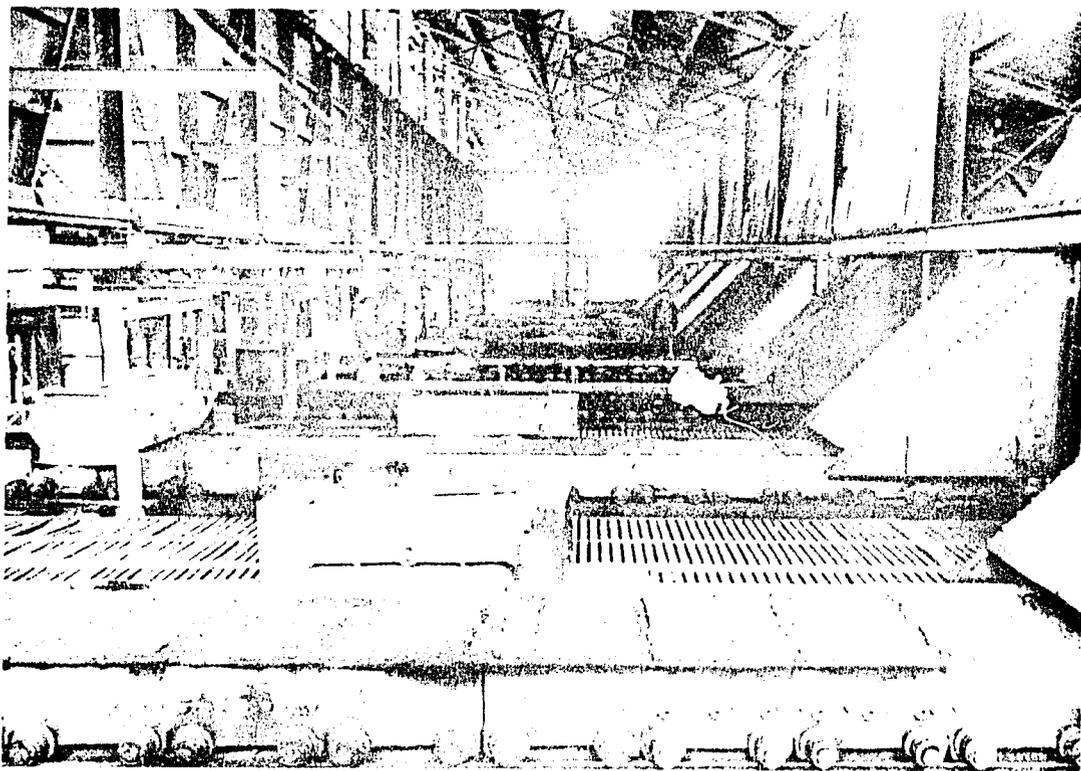
sation for silicosis, no company has tried to find out the composition or concentration of its dust exposures; to insist on wet drilling at all times; to provide mechanical ventilation where required; to use wet methods in other dust-producing operations such as loading and dumping; or to make anyone responsible for the maintenance of control methods. Respirators used in some of the mines and mills were of the unapproved type, and no maintenance services were offered when respirators were employed. Everything for compensation but nothing for prevention seemed to be the rule. Other pertinent observations on working conditions in the mines will be discussed later in this report, when the subject of occupational diseases is treated.

At this point, it may be well to discuss working conditions in the large and only smelter in Perú in somewhat greater detail. This smelter employed approximately 3,000 persons and produced some 12 different products, including lead, copper, and silver. In addition to the smelter itself, there were many maintenance shops essential to such operations.

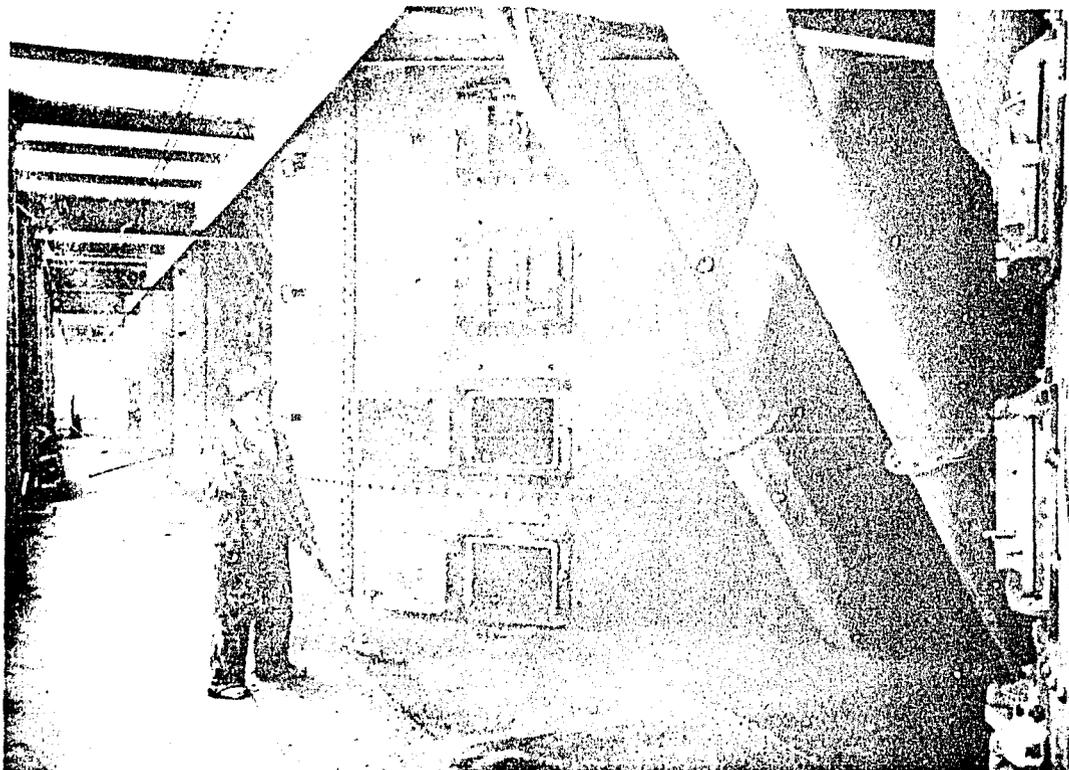
The *foundry* which employed about 80 men on one shift was a combination brass, steel, and iron foundry. Housekeeping in this shop was very bad. On dusty operations, the men wore cloth bag



Lead melting pots in a smelter.



Lead sinter conveyors in a smelter.

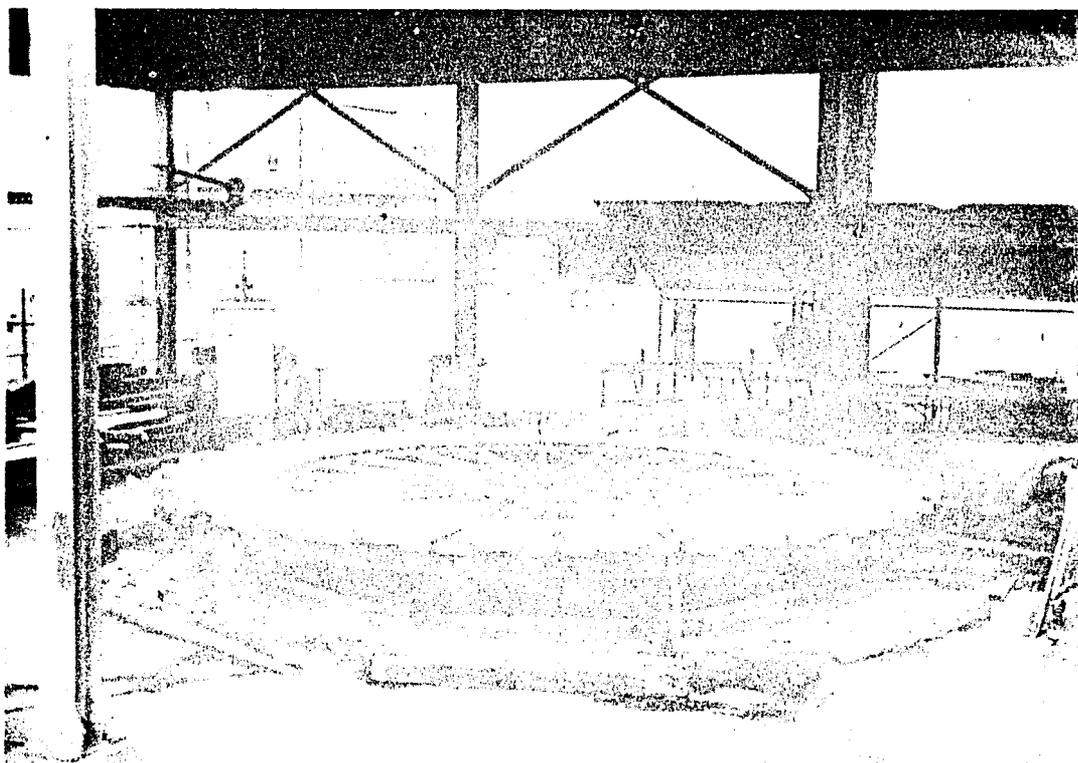


Type of respiratory protection often encountered at metal roasting operations.

respirators. Sandblasting was done outside the building but with no control. There was a definite potential silicosis hazard in this shop.

The *machine shop*, although offering no occupational disease hazards, contained many safety hazards from moving machinery, unguarded belts and gears.

The *steel fabricating shop* contained welding, forging and rolling operations. It was observed that many workers who were



Lead cathode starter machine.

welding did not wear goggles and that many of the welding operations were unshielded, thus exposing nonwelders to welding hazards.

The *carpenter shop* contained many accident hazards from unguarded moving machinery.

The *ore crushing and grinding department* handled about 2,000 tons of ore a day. Some of these ores contained as much as 75 per cent total silica. There was absolutely no attempt made to control dust on such operations as dumping, crushing, grinding, and mechanical conveying, so that clouds of dust given off polluted the entire plant. Although most workers were supplied with respirators and wore them, not a single respirator was of an approved type.

The *copper roaster*, nearby, gave off tremendous quantities of sulfur dioxide gas. Nearly 1,200 tons of this gas were discharged through the furnace stack every day and polluted the atmosphere.

About 12 people worked in the *arsenic department*. Although dermatitis cases occurred in this plant, it was claimed that no cases of poisoning occurred. Personal hygiene in this department was rather good on the whole. The men were furnished clean overalls, bathing facilities, and a separate lunchroom. However, case histories on some of these men showed symptoms suggestive of arsenic poisoning.

The *copper furnace room* also contained two lead blast furnaces. The operations in and about the lead furnaces were mostly unenclosed, so that there was ample opportunity for exposure to high concentrations of lead dust and fumes. This was especially true at the two lead sintering machines, which were observed to give off heavy clouds of lead oxide fumes. Other toxic lead locations were found around the lead furnaces, in the production of lead cathode-starters, and in the lead rolling mill.

No cases of zinc oxide chills had been reported from the *zinc roaster department*, but the exposure should be studied.

There were potential hazards from hydrofluoric acid in the *hydro-fluosilicic acid plant*. There was also a silicosis hazard in this plant, since the raw materials employed were free silica, fluorspar, and sulfuric acid.

There was also a potential silicosis hazard in the *brick manufacturing plant*.

This smelter contained many hazards to safety and health. The only exhaust ventilation installations observed were those in connection with coal pulverizing, where it was necessary to protect the plant from dust explosions.

The *antimony plant* was also well controlled, but primarily in order to recover antimony. Housekeeping throughout the entire plant was very bad.

A company as large as this one, employing nearly 12,000 workers in all operations, would find it profitable, in the long run, to pay some attention to the control of occupational diseases. In fact, it would be of distinct monetary benefit to the company and a forward step in labor relations if management established a full-time industrial hygiene department, with responsibility to study and control occupational diseases. Such a department should be responsible only to top management, so that its recommendations would be put into effect expeditiously. As a start, it would be

TABLE 8. - WORKING CONDITIONS IN EACH OF THE ESTABLISHMENTS SURVEYED.

PLANT NO.	TYPE OF INDUSTRY	NUMBER OF WORKERS	AVERAGE WAGE SOLES PER DAY ^{1/}	SHIFTS WORKED	ANNUAL LABOR TURNOVER	PRINCIPAL EXPOSURES	CONTROL MEASURES	SAFETY HAZARDS	GENERAL OBSERVATIONS
1	METAL MINE.....	250	5.2 TO 7.8	2	VERY HIGH	SILICA; LEAD	SOME WET METHODS	ALL TYPES	WELL MANAGED, BUSY MINE.
2	METAL MINE AND MILL.....	3,000	6.5	2	SLIGHT	SILICA; SULFUR DIOXIDE; HEAT	WET METHODS; RESPIRATORS* MECH. VENTILATION*	SOME IN SHOPS	MILL WELL EQUIPPED AND LAID OUT.
3	COPPER MINE AND MILL.....	650	1.6 TO 5.8	2	100%	SILICA; BLASTING FUMES. WET MINE	NONE	SOME	MINERS DO NOT WEAR SKULL GUARDS.
4	METAL MINE AND MILL.....	707	6.5	2	SLIGHT	FREE SILICA	WET METHODS; MECH. VENTILATION	ALL TYPES	-
5	METAL MINE AND MILL.....	626	6.5	2	SLIGHT	QUARTZ. MILL VERY DUSTY.	WET METHODS*	ALL TYPES	UNDERGROUND WORKPLACES FAR FROM SHAFT. OLD CONCENTRATOR.
6	METAL MINE AND MILL.....	1,487	6 TO 6.5	2	50%	HIGH SILICA ORES	WET METHODS	ALL TYPES	MILL AND SHOPS TERRIBLY DIS-ORGANIZED, DANGEROUS. 6 CASES SILICOSIS CERTIFIED 1946.
7	METAL MINE AND MILL.....	500	6	2	HIGH-UN-SKILLED	SILICA. WET ORE AT MINE. DUSTY AT MILL	WET DRILLING ONLY	ALL TYPES	VERY OLD MINE AND MILL, DANGEROUS, MACHINERY ANTIQUATED, BADLY MAINTAINED.
8	VANADIUM MILL.....	750	6.5	3	35%	VANADIUM ORE. VERY DUSTY	EXHAUST FANS AND COLLECTORS*	ALL TYPES	VERY DUSTY, DIRTY, HAZARDOUS. BAD HOUSEKEEPING.
9	GOLD MINE AND MILL.....	450	4.2	2 - MINE 3 - MILL	100%	SILICA; SOME MERCURY AND SODIUM CYANIDE	WET METHODS WHEN POSSIBLE	ALL TYPES IN MILL	VERY DRY MINE - WATER HAULED BY CABLE IN TUNES. BAD WORKING CONDITIONS.
10	METAL SMELTER.....	3,150	6.5	3	SLIGHT	SILICA, LEAD AND ARSENIC OXIDES, ZINC, ETC.	NONE	ALL TYPES	POOR HOUSEKEEPING; MANY HAZARDS. 271 CASES SILICOSIS AND 16 LEAD POISONING CERTIFIED 1946.
11	COAL MINE.....	1,900	6	2	HIGH	SOME SILICA; PITUMINOUS COAL	NONE	KEPT AS SAFE AS POSSIBLE	LOW VEIN MINE, WELL MANAGED. COAL OBTAINED WITH DIFFICULTY.
12	COAL MINE AND WASHER.....	500	5 TO 10	2	HIGH	SILICA; COAL, DYNAMITE	NONE	ALL TYPES	VERY DUSTY, DANGEROUS. CAMP POLLUTED WITH COAL DUST FROM SCREENS.
13	COAL WASHER.....	150	6	3	SLIGHT	SEMI-ANTHRACITE COAL DUST	NONE	ALL TYPES	VERY DUSTY; PRIMITIVE MACHINERY.
14	OIL AND GASOLINE PRODUCTION	5,000	10 (8.5 MIN.)	1 TO 3	SLIGHT	SILICA, CARBORUNDUM, SPRAY PAINTING, WELDING	NONE IN SHOPS. REFINERY CONTROLLED	ALL TYPES	REFINERY WELL MAINTAINED. SHOPS OLD, POORLY MAINTAINED.
15	DAM AND TUNNEL CONSTRUCTION	1,060	5 TO 8	3-TUNNEL 2-SHOPS	VERY HIGH UNSKILLED	GRANITE DUST; BLASTING FUMES; CO: HEAT	WET DRILLING AND BLOWERS*	USUAL	VERY DUSTY; POOR VENTILATION; EXTENSIVE SILICOSIS.
16	R.R. AND POWER PLANT CONSTRUCTION.....	350	6	1	HIGH	COAL DUST; CO	NONE	USUAL	OLD MACHINE SHOPS AND REPAIR FACILITIES. TO BE REBUILT.
17	WOOL CLOTH MILL.....	984	2 TO 2.5 (START) 4 TO 5 (SKILLED)	3	150%	ORGANIC DUST - TEXTILE DYES	NONE	ALL TYPES	VERY OLD, ARCHAIC PLANT; BAD HOUSEKEEPING. CLOTHING AND HAIR HAZARD FOR WOMEN WORKERS.
18	CEMENT PRODUCTION.....	809	8 TO 11	3	SLIGHT	CEMENT DUST. VERY HEAVY	BAG TYPE RESPIRATORS*	USUAL	MODERN MACHINERY BUT UNCONTROLLED.
19	ASBESTOS BUILDING MATERIAL	180	7 TO 14	1	40%	FEW EXPOSED TO ASBESTOS	LOCAL EXHAUST. RESPIRATORS*	SLIGHT	MODERN, WELL MAINTAINED PLANT. SAFETY AND HEALTH MINDED.
20	REFRACTORY BRICKS, CHINAWARE.....	262	15 TO 20 SKILLED	2	SLIGHT	SILICA, FELDSPAR, CLAY	RESPIRATORS*	ALL TYPES	VERY DUSTY; BAD HOUSEKEEPING. CO. SUPPLIES WORK CLOTHES.
21	GLASS BOTTLES.....	170	7.2 (FOR 60%) 15 TO 18 (40%)	3	SLIGHT	SILICA, OTHER DUSTS	FEW WILLSON RESP. AIR DOUCHES FOR BLOWERS	ALL TYPES	DUSTY, N. EXHAUST VENTILATION. MANY HAZARDS

^{1/} 6.5 soles equivalent to \$1.00 official exchange.
* Ineffective controls or unapproved respirators.

imperative for this company to employ immediately a trained industrial hygiene engineer who could begin to control the many toxic exposures now present in the smelter.

MANUFACTURING INDUSTRIES - With the exception of one plant visited, the typical manufacturing plant in Perú is seriously lacking in health and safety practices. Accident hazards were the rule and ran the gamut from unguarded machinery, bare electric wires, slippery floors, and unguarded stairways to bad housekeeping. Grinding wheels were unguarded and unexhausted and very few workers wore goggles when using them. Of the four manufacturing plants which handled toxic dusts, such as silica and asbestos, only one made any effort to install dust control equipment. The remaining three had heavy exposures to dust. The cement plant could be spotted some distance away from its location merely by the dust cloud which appeared on the horizon, even during a typical Lima winter overcast. In these plants, too, whenever respirators were worn, they were of the cheap, unapproved and ineffective variety. The textile mill which produced woolen cloth was archaic. All machinery was unguarded, floors were wet and slippery, and the few sanitary facilities available were at some distance outside the plant. Most of the women workers, of whom there were 350, were Indians and wore long braids and many layers of exposed clothing. Both are conducive to accidents from unguarded machinery.

OCCUPATIONAL DISEASES

Although Perú has had an occupational disease compensation law since January 12, 1935, it is practically impossible to obtain nationwide statistics on the incidence of occupational diseases. The reason for this paucity of data is to be found in the manner in which compensation for occupational diseases is administered. For example, if a worker believes that he is suffering from an occupational disease, he goes before the company physician, who examines him. If he finds the worker's claim valid, the doctor certifies him to the company for payment. If the legal department of the company refuses to pay the claim, the worker has recourse to the local judge of the Ministry of Justice and Labor. If the claim fails to be adjudicated in the regional office of the Ministry of Justice and Labor, the worker's last recourse is the court in Lima. It is apparent, therefore, that whatever data are available are scattered, and information is not centralized. However, some idea of the incidence of occupational diseases in Peru was obtained during this survey from the records of a few companies which collected such information.

The present occupational disease law provides disability payments for the pneumoconioses, and for poisoning incurred from exposure to mercury, arsenic, lead, bismuth, carbon monoxide, quart-

zite, calcite, cement, pitch, and hydrocarbons. Payment of indemnities for these causes, as well as for X-ray burns, is made on the same basis as for industrial accidents. In addition, acute or chronic pathological disorders, which may be brought on by the inhalation of noxious fumes or poisonous substances, are also considered on the same basis as industrial accidents. Two stages of disability are recognized for the pneumonocioses, namely, total and permanent disability and partial and permanent incapacity.

One firm which employs nearly 12,000 workers reported that 271 cases of silicosis were certified by its medical department for payment in 1946. This same firm also reported 16 cases of lead poisoning which occurred in its smelter that year. Two years previously the same firm had reported 25 cases of lead poisoning at its smelter. Forty-two cases of dermatitis occurred in this plant in 1946 and 17 during the first six months of 1947.

A total disability case in Perú costs 2,400 soles. A worker who receives total compensation is released. He is also entitled, by law, to service time payment amounting to two weeks' salary for each year worked. It is obvious that compensation payments were an expensive item in this particular company's budget. In fact, some half million soles (\$80,000 at the official rate of exchange) were paid by this company for occupational disease compensation in 1946. In addition, this firm paid \$60,000 a year in bonuses to workers exposed to lead hazards. This same firm also spent approximately \$180,000 to operate its 135-bed hospital. No data were available on the amount of money this firm paid its workers because of general illnesses. Although not required by law, this company paid its workers half salary for the duration of any illness. Because of this extra expenditure, it was not possible to figure out the total amount of money spent by this firm for disability cases, but it certainly must have been close to a half million dollars a year. It was quite obvious that this company was wasting not only its own capital, but also that of its workers through loss in wages, ill health, and inefficiency. A modern preventive health program run by the company, under the leadership of the Government, is the only answer.

One of the factors influencing high compensation expenditures for silicosis in Perú is the practice of paying workers for partial disability for silicosis, as provided by law. This practice overlooks the fact that the medical profession does not have the exact scientific tools for evaluating partial disability for silicosis. The X-ray is a great aid in the diagnosis of chest conditions, but most authorities agree that in the field of silicosis it is an inadequate instrument for assessing disability from silicosis, except in a gross manner. Neither is it possible to assess partial disability by daily work capacity, since that criterion varies with

personal incentive, natural physical and mental endowments, and the nature of the job. Clinical criteria are also quite inadequate. A thorough study of all the factors involved is needed to arrive at a diagnosis of total disability. The problems involved in an attempt to assess partial disability are even greater.

In Perú, there seems to be no consistency with regard to the handling of partial disability cases. For example, some concerns employ men underground with first and second stage silicosis, while others pay total disability for silicosis in its early stages. A far better approach to the silicosis problem would be to control the dust exposure to a safe limit and keep the man on the job. So long as he does not inhale more dust, his disease in the early stages should not progress. Only if infection sets in should he be indemnified for total disability and taken off the job. Experience in the United States has shown that, barring infection, a man with early silicosis is capable of doing a fair day's work, provided he is protected from exposure to dust. Indemnifying a worker for partial disability from silicosis does him harm rather than a favor, since he finds it difficult to procure employment elsewhere.

Other examples of occupational diseases in Peruvian industry are at hand. In one mine, which employed nearly 1,500 workers at its various installations, some 1,900 applicants for work were examined in 1946. Three per cent of these were rejected because of silicosis apparently acquired elsewhere. Another mine, employing some 500 men, examined 890 applicants for work during the first six months of 1947. Nine per cent of these men were rejected because of silicosis and 14 per cent because of tuberculosis. Still another mine, employing about 450 men, reported that eight per cent of its workers had silicosis and tuberculosis. Another mine, employing 500 workers, reported 26.1 per cent illness among its workers. The causes were pneumonia, grippe, bronchial pneumonia and silicosis. There were 84 cases of silicosis at this establishment. At this same mine, 19 per cent of 815 persons examined for employment in 1946 were rejected because of silicosis and tuberculosis. Of the 156 men rejected for these two causes, 128 had silicosis. And finally, the experience of still another mine was available for the period 1935 through 1942. During those eight years, out of some 6,499 men examined, 14.3 per cent were found to have silicosis. During the same period, only 1.9 per cent of those examined were found to have tuberculosis.

It is obvious from the above data, even though they are from scattered sources, that high rates of silicosis and tuberculosis exist throughout Peruvian mines and mills. Unquestionably, these rates are an underestimate, since it is known that a high labor turnover tends to mask true conditions. Labor turnover in the factories is slight, with the exception of one factory where it was

reported to be 50 per cent annually. But in most of the mines it is extremely high, running from 35 and 50 per cent yearly to more than 100 per cent, especially for unskilled labor.

It should be pointed out that there are many factors influencing the high labor turnover, among them being the fact that many of the unskilled workers like to return to their farms for several months of the year during planting and harvesting time. On the other hand, one cannot escape the fact that high turnover is due largely to bad working conditions, low pay, and extremely bad living conditions. Much has already been made of the fact that men live in company camps where restrictions are placed on their freedom. Workers feel that, no matter how bad living conditions are on their farms, at least they are in their own homes and enjoy a certain sense of stability and freedom.

At the present time, Peruvian mines are in dire need of labor, and production is at a very low ebb. This survey revealed that anywhere from two to three hundred men were needed at each mine and mill without exception. A simple computation reveals the fact that the mines of Perú could use thousands of men to produce minerals and other resources which are at hand and which would go a long way toward raising the standard of living and the prosperity of the nation. The present practice of running mines with silicosis hazards, paying off men with partial or total disability, and doing nothing to clean up hazardous conditions, only serves to deplete the nation's labor force. Apparently, something drastic must be done to eliminate the various evils discussed in this report, if production and purchasing power are to be raised.

Before leaving this section, it is only fair to point out that management has difficulties in obtaining full-hearted cooperation from the workers in its few attempts to control accidents and occupational diseases. Because of the low order of education of Peruvian labor, it is difficult to get many workers to use preventive measures, such as wet drilling. Labor is quite militant in Peru and is difficult to handle, even though the labor laws provide for disciplinary action when health and safety rules are broken by workers. Experience has shown that education is a far stronger weapon than discipline, and it would pay management to inaugurate an educational program among its workers in the field of health and safety. Such a program would not be a luxury, but would pay monetary dividends. Such a program has been found to be sound business practice in other countries.

SAFETY PROVISIONS

Responsibility for safety practices has not been given to the new Department of Industrial Hygiene, but will continue to be administered by the Labor Department and the Department of Mines.

However, since safety is so closely linked with health, the subject was not by-passed during the survey.

As mentioned earlier in this report, safety hazards in mines and factories reflected the lack of attention paid to safety precautions. Only eight establishments surveyed employed full-time safety directors, and four plants employed them on a part-time basis. Even in those plants which had personnel responsible for safety practices, many obvious safety hazards were found to exist. This lack of attention to safety was reflected in the accident experience of many concerns. One large establishment with a population of nearly 12,000 workers experienced 14 deaths and 1,006 lost-time accidents in 1946. This experience yields a frequency rate of 39.87 per million man-hours of exposure. One mine which employed 1,500 persons, and which had obvious safety hazards both above and below ground, experienced 1,410 minor accidents, 31 serious and ten fatal accidents in 1946.

In none of the Peruvian industries surveyed were there such instrumentalities for the improvement of health and safety as shop committees or joint labor-management health and safety committees. These committees have been found to be extremely useful in the control of health and safety hazards in some of the more highly industrialized nations of the world. (See Tables 6 and 9).

No current national statistics were available for accidents in mines, but data were at hand for 1944. In that year, there was a total of 2,854 accidents in the mines and mills. For manufacturing plants, the latest data available were for 1945, when a total of 18,310 accidents was reported.

SANITATION FACILITIES

Sanitation facilities in the 21 establishments surveyed were inadequate. Public water supply systems were available to four plants. The remaining 17 establishments, which employed the majority of the workers in the survey, were furnished water from private systems. In only one plant was the water filtered. In most instances, the water came from unapproved sources, and in some of the mining camps the water supply was scarce.

No drinking facilities were available in seven establishments employing 15 per cent of the workers. Eight establishments with 44 per cent of the workers had drinking fountains. In five establishments workers drew water from spigots, and in three others open buckets and carboys were used.

No washing facilities were available in 13 establishments employing almost one-half, or 41 per cent, of the workers surveyed. One of these establishments was a manufacturing plant, and the rest

TABLE 9. - TYPE OF MEDICAL AND SAFETY PROVISIONS OR SERVICES PROVIDED IN EACH OF THE ESTABLISHMENTS SURVEYED.

PLANT NO.	TYPE OF INDUSTRY	NUMBER OF WORKERS	HOSPITAL	FIRST AID			PHYSICIAN	NURSE (FULL-TIME)	DENTIST	EXAMINATIONS			ENVIRONMENTAL HYGIENE PROGRAM	SICKNESS BENEFITS SUPPLEMENTED BY	RECORDS KEPT			SAFETY DIRECTOR
				ROOM	KIT	WORKER				PRE-EMPL.	PERIODIC	X-RAY INCLUDED			ACCIDENT	OCCUPATIONAL	NONOCCUPATIONAL	
1	METAL MINE.....	250	CO. OWNED	X	X	X	FULL-TIME	4	PART-TIME	X	X	-	-	MGT.	X	X	X	PART-TIME
2	METAL MINE AND MILL.....	3,000	CO. OWNED. 12 BEDS. CARE TO FAMILIES.	X	X	X	FULL-TIME	4 AND 1 AT MINE	FULL-TIME	X	-	-	-	MGT.	X	X	X	FULL-TIME
3	COPPER MINE AND MILL.....	650	CO. OWNED. POORLY EQUIPPED. NO X-RAY	1/ X	X	X	FULL-TIME	2 PRACTICAL	-	X	-	-	-	MGT.	X	X	X	FULL-TIME
4	METAL MINE AND MILL.....	707	CO. OWNED. 6 BEDS. NO X-RAY.	X	X	X	FULL-TIME	1	-	X	-	-	-	MGT.	X	X	X	FULL-TIME
5	METAL MINE AND MILL.....	626	CO. OWNED. 9 BEDS. NO X-RAY. FAIRLY WELL EQUIPPED.	X	X	X	FULL-TIME	2 PRACTICAL	PART-TIME	X	-	-	-	MGT.	X	X	X	-
6	METAL MINE AND MILL.....	1,887	CO. OWNED. 10 BEDS. INADEQUATE. CARE TO FAMILIES.	X	X	X	FULL-TIME	3	FULL-TIME	X	-	-	-	MGT.	X	X	X	FULL-TIME
7	METAL MINE AND MILL.....	500	CO. OWNED. 12 BEDS. POORLY EQUIPPED. CARE TO FAMILIES.	X	X	X	FULL-TIME	2	PART-TIME	X	-	X	-	MGT.	X	X	X	-
8	URANIUM MILL.....	750	CO. OWNED. NO X-RAY. INADEQUATE.	X	X	X	FULL-TIME	3	PART-TIME	X	-	WILL	-	MGT.	X	X	X	PART-TIME
9	GOLD MINE AND MILL.....	450	CO. OWNED. 13 BEDS. NO X-RAY. INADEQUATE	X	X	X	FULL-TIME	2 AND 1 PRACTICAL	-	X	-	-	-	MGT.	X	X	X	-
10	METAL SMELTER.....	3,150	CO. OWNED. 135 BEDS. FAIRLY MODERN. CARE TO FAMILIES.	X	X	X	12 FULL-TIME	15	FULL-TIME	X	ON FARMERS	-	-	MGT.	X	X	X	FULL-TIME
11	COAL MINE.....	1,900	CO. OWNED. 6 BEDS. SERIOUS CASES SENT ELSEWHERE.	X	X	X	FULL-TIME	2	-	X	-	-	-	MGT.	X	X	X	PART-TIME
12	COAL MINE AND WASHER.....	500	CO. OWNED. INADEQUATE AND DIRTY	X	X	-	FULL-TIME	4	-	-	-	-	-	MGT.	X	X	X	PART-TIME
13	COAL WASHER.....	150	-	X	X	X	ON CALL	1	-	X	-	-	-	MGT.	X	X	X	-
14	OIL AND GASOLINE PRODUCTION	5,000	CO. OWNED. 90 BEDS. MODERN. WELL STAFFED. CARE TO FAMILIES	X	X	X	10 FULL-TIME	13	2 FULL-TIME	X	ANNUAL	X	-	MGT.	X	X	X	FULL-TIME
15	DAM AND TUNNEL CONSTRUCTION.....	1,060	CO. OWNED. 15 BEDS. NO X-RAY & BED MATERNITY HOSPITAL.	X	2/ X	3	FULL-TIME	6	ON CALL	X	-	-	-	MGT.	X	X	X	FULL-TIME
16	R.R. AND POWER PLANT CONSTRUCTION.....	350	SCISP OPERATED.	-	X	-	ON CALL	-	ON CALL	X	-	-	-	MGT.	X	X	X	-
17	WOOL CLOTH MILL.....	984	(MAINTAIN NURSERY)	X	X	X	PART-TIME	1	-	X	-	-	-	MGT.	-	-	-	-
18	CEMENT PRODUCTION.....	809	THRU NAT'L SOCIAL INS. FUND	X	X	X	PART-TIME	-	-	X	-	-	-	MGT. AND UNION	X	-	X	-
19	ASBESTOS BUILDING MATERIAL.....	180	-	X	X	(P-T)	PART-TIME	-	ON CALL	VOLUNTARY	-	-	X (ENG'R)	MGT.	X	X	X	FULL-TIME
20	REFRACTORY BRICKS, CHINAWARE.....	262	THRU NAT'L SOCIAL INS. FUND	X	X	X	PART-TIME	-	ON CALL	X	ANNUAL	-	X (PNTC'R)	MGT.	X	X	X	-
21	GLASS BOTTLES.....	170	-	X	X	-	ON CALL	-	-	-	-	-	-	MGT.	X	X	X	-

1/ 4 stations underground
2/ One in each tunnel

TABLE 10. - TYPE OF SANITARY FACILITIES PROVIDED IN EACH OF THE ESTABLISHMENTS SURVEYED.

PLANT NO.	TYPE OF INDUSTRY	NUMBER OF WORKERS	WATER SUPPLY	SEWAGE DISPOSAL	DRINKING FACILITIES	WASHING FACILITIES	TOILET FACILITIES	LOCKERS	FEEDING FACILITIES AT WORKPLACE
1	METAL MINE.....	250	PRIVATE	NONE	SPIGOTS	NONE	STRADDLE PRIVIES	-	EAT AT HOME
2	METAL MINE AND MILL.....	1,000	PRIVATE	PRIVATE SYSTEM	BUCKETS	SHOWERS, COLD WATER	PRIVY; NONE UNDERGROUND	-	SPACE PROVIDED AT EACH MINE LEVEL
3	COPPER MINE AND MILL.....	650	PRIVATE	OPEN DITCH	NONE	NONE	PRIVY	-	LUNCH BROUGHT UNDERGROUND BY FAMILY
4	METAL MINE AND MILL.....	707	PRIVATE	NONE	FOUNTAIN AT MILL	NONE	DROP PRIVY; CANS UNDERGROUND	-	NONE
5	METAL MINE AND MILL.....	626	PRIVATE	OPEN DITCH	SPIGOTS	NONE	LATRINES	-	SPACE PROVIDED IN MINE
6	METAL MINE AND MILL.....	1,487	PRIVATE	OPEN DITCH	SPIGOTS	NONE	LATRINES	-	SPACE PROVIDED
7	METAL MINE AND MILL.....	500	PUBLIC	OPEN DITCH	FOUNTAIN AT MILL	SPIGOTS, COLD WATER	LATRINES	-	SPACE PROVIDED AT MINE LEVEL
8	VANADIUM MILL.....	750	PRIVATE	NONE	FOUNTAIN	NONE	STRADDLE PRIVY	-	EAT AT HOME
9	GOLD MINE AND MILL.....	450	PRIVATE	NONE	NONE	NONE	LATRINES	-	NONE
10	METAL SMELTER.....	3,150	PRIVATE	NONE	FOUNTAIN	BASIN, SHOWER, HOT AND COLD WATER	TROUGHS	(FEW)	SPACE PROVIDED
11	COAL MINE.....	1,900	PRIVATE	OPEN DITCH	BUCKETS	SHOWER, HOT AND COLD WATER	STRADDLE PRIVY	-	SPACE PROVIDED
12	COAL MINE AND WASHER.....	500	PRIVATE	NONE	NONE	NONE	LATRINES	-	EAT AT HOME
13	COAL WASHER.....	150	PRIVATE	OPEN STREAM	FOUNTAIN	BASIN, COLD WATER	LATRINES	-	EAT AT HOME
14	OIL AND GASOLINE PRODUCTION....	5,000	PRIVATE	PRIVATE SYSTEM	FOUNTAIN	BASIN, SHOWER, COLD WATER	FLUSH	-	LUNCH BROUGHT TO WORKPLACE
15	DAM AND TUNNEL CONSTRUCTION....	1,060	PRIVATE	PRIVATE SYSTEM	NONE	NONE (NEAR HOMES)	PIT PRIVY	-	EAT AT HOME. DINING ROOM FOR SINGLE MEN
16	R.R. AND POWER PLANT CONSTRUCTION.....	350	PUBLIC	PUBLIC	NONE	NONE	FLUSH	-	NONE
17	WOOL CLOTH MILL.....	984	PUBLIC	TO RIVER	SPIGOTS	BASIN, SHOWER, COLD WATER (OUTDOORS)	FLUSH (OUTDOORS)	CLOTHES HANG ON NAILS	EAT AT HOME
18	CEMENT PRODUCTION.....	809	PRIVATE (WELL)	SEPTIC TANKS	SPIGOTS	NONE	FLUSH	-	NONE
19	ASBESTOS BUILDING MATERIAL.....	180	FILTERED WELL	WATER CARRIAGE TO RIVER	FOUNTAIN	BASIN, SHOWER, COLD WATER, SOAP, TOWEL	FLUSH	X	SPACE PROVIDED. COMPANY SERVES 8 O'CLOCK COFFEE
20	REFRACTORY BRICKS, CHINAWARE....	262	PRIVATE	PUBLIC	CARBOYS; COMMON CUP	SPIGOTS, COLD WATER	FLUSH	BEING BUILT	NONE
21	GLASS BOTTLES.....	170	PUBLIC	PUBLIC	FOUNTAIN	BASIN, SHOWER, COLD WATER, SOAP, TOWEL	FLUSH	X	SPACE PROVIDED

were mining enterprises. Seven plants employing 43 per cent of the workers provided wash basins or had spigots available for washing purposes. Seven plants, employing 56 per cent of the workers, provided some showers. Only two establishments, a mine and a smelter, provided both hot and cold running water, and two of the manufacturing establishments provided individual towels and soap. As a rule, towels and soap, when used, were provided by the workers themselves.

Toilet facilities in the plants and mines were even worse than those provided the men in their homes. Flush toilets were available in only two of the mining enterprises and in four of the manufacturing group of establishments surveyed. In the remaining 15 establishments, covering 64 per cent of the workers, facilities consisted of latrines, ditches or troughs, and cans underground. One large mine provided no underground facilities whatsoever. In general, these facilities were inadequate and grossly insanitary.

Only three per cent of the establishments, employing four per cent of the workers, had public sewage disposal systems, while six used private methods of sewage disposal. In the remaining 12 establishments (all in the mining group), which employed 48 per cent of the workers, either no sewage disposal facilities were provided, or open ditches were used for this purpose.

Lockers for street clothing were the exception rather than the rule. They were provided by three plants, employing six per cent of the workers. Two of these plants were in the manufacturing group of industries. One other plant was building locker rooms at the time of the survey.

Lunchrooms, or space for eating, at the work place were provided by four establishments and in four of the mines underground. These covered a little over one-third of the surveyed population. Seven establishments provided no space, although most of the workers ate their lunch at the work place. In six of the mining enterprises the workers went home for lunch, as did the mill workers in seven of the mining and milling establishments. One camp provided a dining room for single men where they could get three meals for one sole per day. One of the plants not only provided lunchrooms for its workers, but also served coffee at four o'clock in the afternoon. This was the only instance encountered in which management undertook supplementary feeding. (See Tables 7 and 10).

MEDICAL SERVICE

According to Peruvian law, all mines and mills which have a staff of 50 or more and are situated more than 30 hours from a resident certified physician must have a staff physician residing

permanently on the site. Those establishments with 100 or more persons must provide dental consultation at least weekly, and if the personnel is 1,500 or more a permanent dental service must be provided. Establishments employing more than 2,000 persons in a locality where no hospital is available within 50 kilometers must provide a hospital. Those mines with less than 50 persons must provide at least a medicine chest and a male nurse trained in first-aid.

Medical services on full-time or limited basis were offered in all but one of the establishments surveyed. In the factories, however, the medical services were of a part-time character.

Hospitals were owned and operated by 14 establishments in the mining group of industries, covering 87 percent of the workers. One construction project had hospital arrangements with the *Servicio Cooperativo Interamericano de Salud Publica*, and two of the manufacturing plants had arrangements with the National Social Insurance Fund for hospitalization of their employees.

A total of 35 full-time physicians were employed in the mining industries surveyed. These were chiefly employed in connection with hospitals operated by these companies. However, two mining camps employed physicians on an "on call" basis. No full-time physicians were retained by any of the five manufacturing plants. Four of these retained physicians on a part-time basis and one on an "on call" basis.

Full-time nurses were employed by 15 establishments in the mining group and by one plant in the manufacturing group. Very few trained nurses were observed with the exception of those employed in the large hospitals maintained by two large mining concerns. Most of the medical assistants were practical nurses, or *practicantes*, as they are called. Most of the smaller mines, that is those employing less than 500 persons, had hospitals with anywhere from six to ten beds, but these could only be classed as first-aid stations. As a rule, these hospitals were poorly equipped, and the one doctor in attendance not only had to take care of all the workers, but their families too. For example, one mine employing nearly 1,500 persons, of whom 800 worked underground, had only one physician in attendance who looked after all the workers and their families. This meant that one physician had to look after six or seven thousand people with only three *practicantes* to assist him. The hospital was extremely inadequate and insanitary. It contained just ten beds, which had no springs or mattresses, but merely planks. Sick people had to bring their own bedding. (See Tables 6 and 9).

There were few exceptions to this state of affairs. On the

whole, the medical and hospital facilities provided most of the workers in the mines visited were inadequate. Furthermore, the physicians in these localities were so overworked that about all they had time to do was to render first-aid and emergency medical care'. In only one plant, one belonging to the Government, was there a physician who also had responsibility to do something about the prevention of occupational diseases and illnesses.

First-aid facilities were provided in practically all establishments surveyed. The construction project did not have a first-aid room nor a trained first-aid worker, but it did have a first-aid kit. One coal mine and a glass manufacturing plant had no trained first-aid workers, but the former employed several practical nurses and maintained a hospital. Some of the mines had underground first-aid stations.

Although physical examinations before employment are required by law, two establishments did not comply with this provision. Periodic examinations were only conducted in two factories and in three mining establishments. In spite of the fact that silicosis is a major health hazard in the mines of Perú and the X-ray a valuable tool in the diagnosis and medical control of this disease, only two mines utilized the X-ray during pre-employment examinations. Another was planning to do so. As a result, most of these establishments were hiring some men who unquestionably were already silicotic. One would expect that some of these plants would at least install an X-ray machine for their own protection so as to weed out silicotics who might put in a claim later.

Very few establishments gave dental services as required by law. Eight establishments in the mining group, employing 64 per cent of the workers maintained full-time or part-time dentists. Two other establishments in this group and two in the manufacturing group had dentists on call, but in most instances these services were not in existence.

SICKNESS BENEFITS

The compulsory social insurance scheme providing benefits for sickness, maternity, invalidity, old age, and death, established by law in Perú in 1936, is now regulated by a decree promulgated in 1941. Compulsory insurance applies to all persons from 14 to 60 years of age who habitually work for an employer and whose annual wage does not exceed 3,000 gold soles. Certain classes of workers, such as Government employees, are excluded from the law. The funds are made up of contributions from the workers (1.5 per cent), employers (3.5 per cent) and the State (1 per cent).

In order to receive sick benefits under compulsory insurance,

the beneficiary must have paid four weekly contributions in the four months preceding sickness. Benefits which start from the third day of illness may continue for 26 weeks, and in protracted illness up to 52 weeks. Medical, hospital, and limited dental services are furnished free. In addition, 50 per cent of the average daily wage is paid as cash benefits during the first four weeks of illness and 40 per cent thereafter. The fund also provides maternity benefits and invalidity benefits when the earning capacity of the workers has been reduced by two-thirds. Old age and death benefits are also provided.

The scheme is administered by the National Social Insurance Fund and managed by an advisory board. Workers' hospitals where treatment under this law may be obtained were in operation. The finest of these was the one in Lima, which opened in 1940. This was one of a network of twelve hospitals which the social insurance fund was constructing. Unfortunately, several of the hospitals constructed by the Fund have not been fully completed inside and lack essential equipment. As a result, many workers in Peru had to put up with the inadequate services provided by some of the industrial establishments.

All workers in the plants surveyed received sickness benefits, as required by law, covering hospitalization, occupational and non-occupational illnesses, and accidents. In 15 of the mining establishments, the workers received additional cash payments from management to supplement the amounts provided by the National Social Insurance Fund. In four manufacturing establishments supplementary sickness benefits were furnished by management and in one manufacturing plant by management and the union.

Disability records on accidents and occupational illness were kept by 17 establishments, employing 76 per cent of the workers. Records on nonoccupational illness were maintained by 18 establishments, employing 79 per cent of the workers. As a rule, these records were inadequate and did not furnish reliable data on the extent of illness among the workers and their families. (See Tables 6 and 9).

Nearly all employed persons in Perú come under the National Social Insurance Fund. Disability records, therefore, were maintained for all of them. However, it was just as difficult to obtain nationwide statistics on sickness as it was on accidents and professional diseases. Sufficient scattered data were obtained to indicate that sickness among employed persons in Perú was a real problem and one which resulted in large monetary losses due to absenteeism.

One large mining concern, employing 5,000 persons, experienced 689 cases of illness during 1946 with a total loss of time from

work of 6,875 days. Another large establishment, employing approximately 2,400 persons, stated that its sickness absenteeism amounted to two per cent. Perhaps the best information covering the fairly large group of employed persons was that obtained from the Obrero Hospital in Lima, which is maintained by the *Caja Nacional de Seguro Social*. The records of this hospital showed that in 1946 it had 106,318 workers on its beneficiary rolls. The lost time among this group for that year totalled 998,960 days. This yields an average of approximately 9.4 days per person per year, a rate considerably higher than the seven days per person per year in some other countries.

It would be helpful if the National Social Insurance Fund would maintain more adequate and complete records, so that it could analyze its experience and, on the basis of its findings, launch a preventive program. Thus it could provide the leadership to help the public health authorities and the industries of the nation conduct such a program.



CURRENT ACTIVITIES CONCERNED WITH INDUSTRIAL HYGIENE IN PERU

Although only the Ministry of Health and Social Welfare is authorized to conduct industrial hygiene activities, other official and nonofficial agencies in Perú have a stake in the problem. Since any long range industrial hygiene program should take advantage of all available resources, the survey included a study of all agencies which had some bearing on the problem.

OFFICIAL AGENCIES

The official agencies covered in the present inquiry were the Department of Labor in the Ministry of Justice and Labor, the Bureau of Mines and Petroleum in the Ministry of Development and Public Works, the Department of Health in the Ministry of Public Health and Social Welfare and the Inter-American Cooperative Public Health Service.

BUREAU OF MINES AND PETROLEUM

The Bureau of Mines and Petroleum is charged with the prevention of accidents in mining establishments. Although the law under which the Bureau functions states that mining establishments must hire security inspectors and regional technical delegates to make inspections and recommendations, the Bureau has one chief mine inspector and three assistants to administer the program in the entire country. Obviously, this is an inadequate staff. Its impotence is reflected in the fact that many safety hazards were observed during this survey.

DEPARTMENT OF LABOR

This Department maintains a division of factory inspection, which concerns itself primarily with safety hazards, employment of women and minors, and workhours and wages. The factory inspection division maintains 21 regional offices. The Department of Labor also handles compensation claims for occupational diseases and accidents. Neither this Department nor the Bureau of Mines concerns itself with industrial hygiene.

DEPARTMENT OF HEALTH

The Department of Health in the Ministry of Health and Social Welfare is a centrally organized activity. The author observed the work of its various divisions, particularly the work of such divisions as sanitary engineering, venereal disease control, nutrition,

malaria control, vital statistics, tuberculosis control, and the National Institute of Hygiene, which operates the laboratories of the Health Department. All these divisions were operating with limited funds and personnel, but evidenced a deep interest in the possible integration of industrial hygiene with their work. As pointed out in the earlier sections of this report, general public health problems in the industries of Perú are so great that it will be essential to integrate industrial hygiene work with the other public health activities if a total health program is to reach all workers. This phase of the program will be discussed in the recommendations which will follow.

INTER-AMERICAN COOPERATIVE PUBLIC HEALTH SERVICE

Under the terms of the contract between The Institute of Inter-American Affairs and the Ministry of Health and Social Welfare setting up the *Servicio Cooperativo Interamericano de Salud Pública*, the work of the *Servicio* is limited to certain areas of the nation. The mining sections in the Central Andes and in the northern and southern sections of the country have not yet been touched by this cooperative program. The *Servicio* is badly needed in these areas, in which the largest part of the nation's population lives and works. It is hoped that the Cooperative Health Service will play an important role in the establishment and development of an industrial hygiene program in Perú.

NONOFFICIAL AGENCIES

Nonofficial voluntary agencies are important resources in the development of public health programs. In fact, badly needed community health services have often been established through their work. Industrial hygiene is mainly concerned with the prevention of disability in industry through proper control of the working environment, medical and surgical care to effect prompt restoration of health and earning capacity following disability, and promotion of good general health among workers.

It is obvious that voluntary organizations can help measurably in the achievements of these objectives. For example, in the United States, the Council on Industrial Health of the American Medical Association has developed standards for physicians who work in industry, as well as for private practitioners. Although it is true that official industrial hygiene agencies can serve as a spearhead for bringing health services to workers, it is also true that most workers turn to their own physicians when they are in need of medical attention. For this reason, work done by the Council of Industrial Health in the United States has been of great value. Similarly, industrial hygiene in the United States

has drawn heavily upon the assistance and support of agencies sponsored by management groups, local medical societies, universities, and progressive labor unions.

There are approximately 1,500 physicians in Perú, nearly 900 of whom reside in Lima. Some of these physicians are employed full-time by industrial concerns, especially in the mining areas. Apparently, emphasis has not been placed on knowledge of the occupational diseases or of the preventive aspects of medical practice.

In Perú, there is a National Chamber of Commerce and also a National Manufacturing Association. Neither of these two management groups has been active in the field of industrial hygiene. Perú also has a National Mining Association which has sponsored a survey by a Canadian mining engineer and has been opposed to the recently enacted industrial hygiene law.

Labor, too, has not shown any active interest in the field of industrial hygiene, except in isolated instances when labor unions demanded investigations of adverse working conditions.

Medical and engineering schools have taken no active part in training students for work in industrial hygiene.

Obviously, Perú has potentialities, among both official and nonofficial agencies, for a coordinated attack on its many and serious industrial hygiene problems. The recommendations which follow attempt to indicate how such a coordinated program can be established and developed.



SUMMARY OF FINDINGS

This report is based on a study of industrial hygiene in Perú made during the period of June 17 to August 29, 1947. The study included an investigation of general living conditions in Perú; a survey of industrial hygiene conditions in 21 representative mines, mills, and manufacturing establishments, employing approximately 23,000 persons; and a brief study of official and nonofficial agencies whose work was related to industrial hygiene.

Following is a summary of the observations made:

1. The number of gainfully employed persons in Perú totals 2,475,339. Of these about 50 per cent are employed in agriculture. Manufacturing accounts for 380,000, and mining for nearly 45,000 workers. The rest are in trades and service industries. In other words, about one-third of the people in Perú (estimated total population 7,853,953) are gainfully employed, and of these about a half million are engaged in industries known to present major health hazards.

2. Living standards among Peruvian workers are extremely low. These conditions exist because of the low wages paid most workers and are aggravated by the economic inflation which currently prevails. Although the miner is somewhat better off than the factory worker in Perú, because of certain employer-provided benefits, his low prevailing wage leaves much to be desired in the standard of living which it can provide. Diet deficiency, poor and inadequate housing, overcrowding and lack of sanitation - the usual accompaniments of low living standards - are widespread. This problem is made more acute by the high rate of illiteracy in the country, especially in the mining regions, and by the scarcity of educational facilities.

3. The development of Perú's rich natural resources is seriously hampered by disease, the control of which has been limited by lack of funds and trained personnel. At present, Perú's public health budget is only 60 cents per year per capita. Trained public health workers, such as doctors and nurses, are in extremely short supply.

Tuberculosis is rampant throughout the country, considerably aggravating the silicosis problem. Because of impure water supplies and lack of sewage treatment facilities, enteric diseases are also very common. Mortality from respiratory diseases in Perú accounts for nearly 30 per cent of the deaths in the country.

4. The magnitude and complexities of the socio-economic and public health problems in Perú indicate that the task of protecting the health of the industrial population is a tremendous one. Much needs to be done for community health in general and for industrial workers in particular.

5. Health and safety consciousness does not exist in Peruvian industry. The extremely unhealthful and hazardous conditions observed are largely the result of lack of interest.

6. Hazards to health and safety abound in all Peruvian industry. In mines, the chief health hazards are exposures to silica dust, sulfur dioxide, heat and high humidity, and fumes from blasting powder. Dry drilling and the handling of dry ores in the mines and mills are common practices. Mechanical ventilation is practically nonexistent, and natural ventilation is insufficient to cope with the dust problem even when wet methods are used.

The only smelter in Perú contains many serious hazards to health, among them exposures to silica dust and lead.

In the manufacturing plants and in most of the mines and mills, safety hazards are created by obsolete and run-down machinery; unguarded moving parts; unsafe floors, stairways, and platforms; exposed electric wires; and poor ventilation and illumination.

7. No reliable nationwide statistics are available on occupational diseases nor on compensation costs for such diseases. However, data obtained from individual enterprises clearly indicate that industrialists in Perú spend hundreds of thousands of dollars needlessly because of the lack of a preventive program.

A corollary of bad working and living conditions is high labor turnover which is a serious problem in Perú. All the mining establishments visited are in dire need of labor. The compensation law, which provides payments for partial disability from silicosis, aggravates this situation, since it makes workers with early silicosis poor insurance risks and, therefore, less employable.

8. Sanitation facilities in mines and mills and in manufacturing establishments are wholly inadequate and in a poor state of maintenance. Water supplies, washing facilities, personal clothing lockers, and other facilities are completely lacking in many establishments and wholly inadequate in others. On the whole, sanitary facilities in the mines and mills are somewhat worse than those provided workers in their homes.

9. Although medical services are available to most industrial workers, the standards of such services are very low. Preplacement

examinations are given to workers in accordance with law, but no agency makes a careful analysis of these examinations in order to raise the health level of the working population. Practically no follow-up examinations are given. In spite of the fact that the chief health hazard in the mines of Perú is silicosis, only two of the surveyed mines use X-ray as a diagnostic tool. No health education work is carried on at these working establishments.

10. Adequate records of accidents, occupational diseases, and sickness are unavailable on a nationwide basis, despite the fact that such data should be available, since workers are indemnified for such disabilities.

11. None of the nonofficial agencies, which should take an interest in industrial hygiene in Perú, have been active in this field to date. The medical profession is poorly informed on occupational diseases and has insufficient knowledge of the preventive aspects of medical practice. Management groups, like the Chamber of Commerce, the Mining Society, and the Manufacturing Association, have in general paid slight attention to industrial health problems. Neither have universities shown the interest necessary in training physicians and engineers for industrial hygiene work.



R E C O M M E N D A T I O N S

In the light of the foregoing observations, the following recommendations are submitted:

1. The *Servicio Cooperativo Interamericano de Salud Pública*, directed by trained and well-qualified personnel, has demonstrated its ability and usefulness in administering a public health program in Perú. It is, therefore, recommended that the activities of the Department of Industrial Hygiene be administered under the direction or with the closest cooperation of the *Servicio Cooperativo Interamericano de Salud Pública*.

The services of a physician and a chemist should be added to this program as soon as possible to supplement the work of the engineer already assigned by The Institute of Inter-American Affairs.

2. The necessary field and laboratory equipment for the three professional persons mentioned should be obtained immediately. A list of the most essential equipment has already been presented to the *Servicio Cooperativo Interamericano de Salud Pública*.

The Department should set up a library. A bibliography of publications on industrial hygiene has been presented to the *Servicio Cooperativo Interamericano de Salud Pública*.

3. The industrial hygiene program should start as soon as is practicable in the region of Cerro de Pasco, with headquarters in the town of Cerro de Pasco, the center of the most important mining area in the Central Andes. This field office should be equipped for the conduct of physical examinations, as required by the new law, and for the activities of an engineer.

Field centers should later be established in La Oroya, Morococha, and Lima. Each field office should be staffed with a physician trained in silicosis techniques, an X-ray technician, an engineer, and a clerk. The necessary apparatus for conducting physical examinations, including X-rays of the chest, and field and laboratory apparatus for the engineer, will also be needed. The Lima office should have portable X-ray and other equipment for conducting physical examinations in the Southern mining area.

The Department's chemical laboratory should be located in Lima at the National Institute of Hygiene, where ample space is available.

4. Personnel, both medical and engineering, should be selected as speedily as possible and sent to the United States for

training. The physician now studying at Harvard should spend at least three months studying silicosis at the Saranac Laboratory for the Study of Tuberculosis before he returns to Perú. In order to initiate the program of physical examinations at once, a physician should be employed immediately. (It is understood that a Peruvian physician will be immediately assigned to this program from the *Servicio Cooperativo Interamericano de Salud Pública* and will receive his training in Perú. A Peruvian chemical engineer has already been selected and engaged to work under the engineer now assigned to the program by The Institute of Inter-American Affairs.)

5. In order to implement the various provisions of the law creating the Department of Industrial Hygiene, qualifications for professional positions in the new Department should be established. Such qualifications have already been submitted to the *Servicio Cooperativo Interamericano de Salud Pública*.

6. The functions of the Department of Industrial Hygiene have been defined in Law No. 10833. In essence, they authorize the Department to carry on a medical and engineering control program in order to minimize and eliminate occupational diseases. The law also authorizes the Department to conduct research, especially with reference to aluminum therapy for silicosis, and to carry on educational campaigns. Because of the Department's importance and because the organization of the Department is basic to most of the recommendations which follow, the Department's functions, personnel, and responsibilities are discussed here at some length.

In the author's opinion, the primary aim of an industrial hygiene program is the achievement and maintenance of good health among the working population. To arrive at this ideal, industrial hygiene must be concerned with employees' working environments and their general living conditions as well. Unhealthful conditions at home and in the community nullify all health efforts made in the plant, and vice versa. One phase of the work is no more important than the other. Both together make a good industrial hygiene program a broad and a complete preventive health program for adults.

In developing the program of this Department, it should be remembered that corrective measures for the protection of the health of industrial workers are put in effect largely by private effort and with the use of private funds. The Department's most important task will be to show industry how to solve its own health problems. The Department should help industry achieve a healthful environment; cooperate with and coordinate the work of all other public and private agencies involved in industrial hygiene activities; develop standards for healthful practices; collect and analyze occupational disease reports; and give impartial advice when it is needed for the adjudication of claims.

In addition to the activities already outlined in the law, the Department should carry on functions which may be grouped as follows: (1) Evaluate industrial working environments and recommend steps to be taken to correct conditions found to be detrimental to health. (2) Advise management and medical supervisors concerning the relative toxicity of materials or processes, giving special attention to new materials prior to their introduction into industry. (3) Offer consultant services to medical supervisors and private physicians regarding illnesses affecting workers. (4) Provide necessary clinical and physical laboratory services. (5) Assist management to develop, maintain, and analyze absenteeism records and to conduct health education programs. (6) Offer technical guidance and advice on adult health programs for workers.

In carrying out this program, the Department should cooperate closely with the Department of Labor, especially with the factory inspection services; with the Bureau of Mines and Petroleum; and with some of the other official agencies discussed in this report. Close cooperation will be required between the Department of Industrial Hygiene and the other departments under the Director General of Health. This latter cooperation is most essential in order that a well-rounded adult health program may be carried on in industry.

The Department of Industrial Hygiene should also be responsible for formulating reasonable rules and regulations for the prevention and control of occupational diseases. (A copy of such rules and regulations and a manual interpreting them have already been transmitted to those responsible for the administration of industrial hygiene in Peru.)

These standards and regulations should be used in making recommendations to industry regarding the correction of conditions inimical to health. It should be pointed out, however, that it is often more successful to persuade management in a friendly fashion than to invoke legal regulations.

The Department should be responsible for collecting and analyzing occupational disease reports. Reports will not be complete, however, unless the Department educates physicians and industrial management to the importance of occupational disease reporting and maintains close contact with them by investigating all reported cases promptly. Rapid follow-up of all reports and correction of the conditions which caused the disease will prevent the recurrence of additional cases.

The Department should also be prepared to render such services as may be needed in the adjudication of compensation claims for occupational diseases, whenever impartial advice is needed to settle the claim.

7. The Department of Industrial Hygiene should take leadership in encouraging large industries to sponsor complete industrial hygiene programs of their own. These programs should include not only activities related to the control of hazards in the working environment, but also activities which will improve workers' general health. In this last respect, the industrial hygiene program should be, in effect, an extension of a general public health program and should make use of all health resources available in the community. For this reason, it is recommended that the *Servicio Cooperativo Interamericano de Salud Pública* establish a health center in Cerro de Pasco which should assume leadership and assist industry toward the achievement of the above objectives. Activities of a health center - tuberculosis control programs, venereal disease control programs, other communicable disease control programs, and other health improvement activities, for example - can be brought to the industrial population through a plant's industrial hygiene program. To accomplish this, the director of the industrial hygiene program in the plant must work closely with the public health authorities. The poor health of the mass of the Peruvian population makes this an urgently needed activity.

The expansion of an industrial hygiene program into the broader field of adult health has been encouraged in the United States by both Federal and State industrial hygiene agencies. Progressive industrial management has been quick to realize that a worker's productivity is directly influenced by his general health.

Because the general level of education is low in Perú, and because the population is negligent of its health, it may be difficult to persuade workers to take advantage of the services offered them. Obviously, some kind of educational program geared to their level of understanding is needed. It may be that the formation of labor-management committees, a technique used with great success in both the United States and Great Britain during the last war, will give the workers a sense of participation and help to overcome many obstacles.

8. The President of the Republic of Perú should appoint an advisory committee to the Department of Industrial Hygiene. The committee should be made up of representatives of the Ministry of Justice and Labor, the Ministry of Development and Public Works, the Ministry of Public Health and Social Welfare, the Peruvian medical society, industrial management, and organized labor. The committee should advise the Department of Industrial Hygiene on matters of policy and operation.

9. The Department of Industrial Hygiene should take leadership in stimulating and coordinating the activities of voluntary organizations which are concerned with industrial health problems.

National organizations, such as the Medical Society, the Chamber of Commerce, the Manufacturer's Association, and the Mining Association, should appoint committees to promote work in this field.

10. One of the first tasks the Department of Industrial Hygiene should assume is the development of courses of instruction for physicians, engineers, and nurses who wish to work in this field. This project should be undertaken with the cooperation of universities and professional societies.

11. As provided by law, the scope of the Department's activities should be extended at the end of two years of operation to include all the industries of Perú. Services should be available to the more than 1,000,000 agricultural workers also, since it is well known that many health problems are associated with agricultural occupations. Many farm workers are exposed to toxic materials in the form of insecticides. Tropical and other diseases, which may be occupational in origin, are also prevalent among this group.

12. In order to assure the new Department of Industrial Hygiene experienced guidance during the period immediately following its organization, the program should be administered by the *Servicio Cooperativo Interamericano de Salud Pública* for at least the next three years. Steps should be taken to include an industrial hygiene program among the cooperative activities carried on by The Institute of Inter-American Affairs and the Ministry of Public Health and Social Welfare of Perú.



APPENDIX I

ORGANIZATION OF THE DEPARTMENT OF INDUSTRIAL HYGIENE
IN THE MINISTRY OF PUBLIC HEALTH

* * * * *

Law No. 10833

The President of the Republic:

Whereas:

Congress has enacted the following Law:

Congress of the Peruvian Republic:

Has enacted the following Law:

ARTICLE 1: The Department of Industrial Hygiene in the Ministry of Public Health and Social Welfare shall begin work regarding prevention and attendance of professional diseases, especially the pneumoconioses.

ARTICLE 2: Work stated in Article 1 shall include, besides work specified by the Executive Power in later dispositions and regulations, the following:

- a) Clinical and radiographic examination of candidates for mining work and the same examination, periodically done, on workmen performing such work;
- b) Medical examinations, requested by the Pneumoconiosis Expert Board;
- c) Medical control of individuals suffering from pneumoconiosis or other professional diseases, who continue working;
- d) Periodic inspection of mines and plants of the industry itself for dust control. This work shall include the sampling and analysis of dusts in suspension, smoke, gases, acids and other noxious substances;
- e) Planning and application of ventilating systems and methods for the mines and working places;
- f) Investigations regarding suitability of installation of apparatus and dust removal equipment and use of given types of protective masks;

- g) Investigations regarding suitability of establishing plants for administration of aluminum powder with preventive and welfare purposes; and medical control of healthy or ailing individuals, subjected to this process in plants to be established as a result of such investigations or by private initiative of companies;
- h) Educational work among the administrative and labor staff of mining companies with purpose of demonstrating usefulness of preventive measures and insuring cooperation to be given for fulfillment thereof; and,
- i) Incorporation of all measures connected with this problem in future.

ARTICLE 3: The Department of Industrial Hygiene shall gradually extend its action to all mining centers of the country, but shall begin operations in the region including the Department of Lima, Ica, Junin, Pasco, Huanuco and Huancavelica.

To duly fulfill its mission and after the necessary studies, it shall establish a Central Office and Departmental Offices in the principal mining regions, said offices to include administrative sections and medical and engineering laboratories, as well as portable equipment, which may be necessary.

ARTICLE 4: The operation of the Department of Industrial Hygiene, in connection with the mining industry and allied industries, shall be maintained by those companies employing over 30 laborers, by a contribution of 1.8 percent on the total amount of payrolls.

The designation "mining company" is understood to include individual or collective persons performing work for making use of any mineral substances and soils, rocks, clays, sands, gravels, and cements, as well as all industrial processes related to the preparation and use of such substances.

There are included in the computation of the tax, salaries of all employed in those industries, under the direct dependency of said individual or collective persons or of contractors and middlemen, without any exception whatsoever.

ARTICLE 5: The contribution established in Article 4 shall begin to govern within 30 days of the promulgation of the present law, in the Departments of Lima, Ica, Junin, Huanuco and Huancavelica. The same contribution shall be applied, successively and with approval

of the Executive Power, to other districts, when the organization of the Department of Industrial Hygiene extends thereto.

ARTICLE 6: Companies may not deduct, directly or indirectly, the amount of the contribution created by this law, from the salaries or other remunerations paid to their employees.

ARTICLE 7: A Board of Vigilance and Economic Control, formed by representatives of the Executive Power and of the industries contributing to the support thereof, the number whereof shall be determined by the Government, shall control the economic progress of the Department of Industrial Hygiene and the investment of its income for the purposes specified in the present law.

ARTICLE 8: After a period of two years, to be counted from the date on which the Department of Industrial Hygiene begins its duties, the Government shall make up another taxation plan, based on the degree of danger of the work in each mining enterprise and the number and source of the cases of professional disease.

The National Bureau of Social Insurance shall proceed to effect the necessary mathematical calculations and within the maximum period of two years, from date of promulgation of the present law, shall establish an insurance for professional diseases, to include the granting of an income to ailing individuals, with partial or total disability, temporary or permanent, which may have been established by the Pneumoconiosis Board of Experts. Said insurance shall include nursing benefits available in hospitals and other dependencies of the National Bureau of Social Insurance.

In the making up of the new taxation plan and establishment of the insurance, referred to in this Article, the information resulting from the studies performed by the Department of Industrial Hygiene shall be used.

ARTICLE 9: The Minister of Public Health and Social Welfare shall make up, within a maximum period of 60 days from the date of promulgation of this law, the necessary drafts for the organization and regulation of the services created thereby, the technical training of its personnel and those necessary for the coordination of the work effected by other Government departments.

ARTICLE 10: Laws and dispositions insofar as opposed to the present law are hereby derogated.

Let this be transmitted to the Executive Power for promulgation.

Congress House, in Lima at ten days of the month of March,
nineteen forty-seven.

(Sgd.) *José Galvez, President of the Chamber of Senators*
Pedro E. Muniz, President of the Chamber of Deputies
L. F. Ganoza, Senator Secretary
A. Haya de la Torre, Deputy Secretary

Therefore: I order this to be published and complied with.

Given in Government House in Lima, at twelve days of the month
of March, nineteen forty-seven.

(Sgd.) *J. L. Bustamente*

(Sgd.) *Alberto Hurtado*



APPENDIX II
INDUSTRIAL HYGIENE SURVEY
GENERAL DATA

Date _____

Name of Establishment _____		Owner _____	
Department _____	Province _____	No. of Employees _____	
Official Interviewed _____	Title _____	Male _____	_____
Products or Service _____		Female _____	_____
		Total _____	_____

Medical Provisions		Benefits and Records		Safety Provisions	
Hospital:	Company _____ Contract _____ None _____	Physician:	Full Time _____ Part Time _____ On Call _____	Sickness Benefits:	Management _____ Union _____ Insur. Co. _____ None _____
First Aid Room	Yes _____ No _____	Nurse:	Full Time _____ Part Time _____ None _____	Extent of Benefits:	Sickness _____ Accident _____ Hospital _____
First Aid Kit	Yes _____ No _____	Dentist	Full Time _____ Part Time _____ On Call _____ None _____	Disability Records:	Occupational _____ Non-occup. _____ Accident _____
Trained First Aid Worker:	Yes _____ No _____	Preplacement Examination:	Yes _____ No _____	Feeding Facilities:	At Workplace _____ _____
Periodic Examination:	Yes _____ No _____	Health and Safety Committee:	Yes _____ No _____	Community:	Type of Stores: _____ _____
Industrial Hygiene Responsibility	_____	Average Wages:	_____	How Operated:	_____
Labor Turnover:	_____	No. Shifts Worked:	_____		
Schools: Type:	_____				
				Sanitation	
				Water Supply:	Sewage Disposal:
				Public _____	Public _____
				Private _____	Private (type) _____
				Approved _____	Washing Facilities:
				Drinking Facilities:	Basin _____
				Fountain _____	Shower _____
				Individual Cup _____	Water: Hot _____ Cold _____
				Common Cup _____	Towel: Com. _____ Ind. _____
				Other _____	Soap _____
				Lockers:	Toilet Facilities:
				Yes _____	Flush _____
				No _____	Pit Privy _____
					Other _____
				Housing Conditions	
				General:	
				No. rooms: _____	Water _____
				No. occupants _____	Sewage _____
				Sanitary Facilities: _____	Toilets _____
					Garbage _____

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