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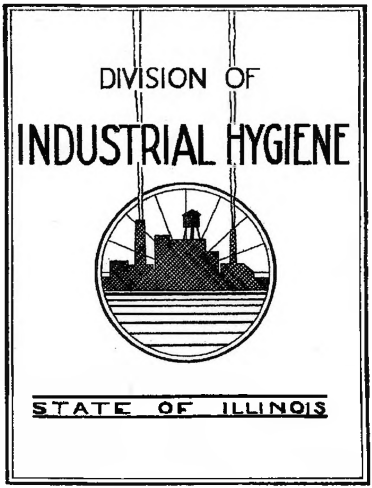
INDUSTRIAL HYGIENE SURVEY

OF

THE PULLMAN COMPANY



STATE OF ILLINOIS
DEPARTMENT OF PUBLIC HEALTH
A. C. BAXTER, M. D., *Acting Director*

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INDUSTRIAL HYGIENE SURVEY

OF

THE PULLMAN COMPANY

CHICAGO

****

ACKNOWLEDGMENTS

The whole report is the result of a co-operative environmental health study of the worker. Space is not available for mentioning by name all those who took part in it. Our duties and tasks were expedited and lightened by the helpful assistance and active cooperation rendered our Division's personnel by Messrs. Guilbert, Lewis, Thorne, Limbrock, Pflager and Doctor DeMotte. We are also deeply indebted to the many others who contributed their share toward its completion.

M. H. Kronenberg, M. D.
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Division of Industrial Hygiene.

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Industrial Hygiene Engineer.

Alfred N. Setterlind
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Chief Chemist.

Chicago, Illinois
April 1, 1938

C O N T E N T S

CONTENTS (Continued)

INTRODUCTION

Industry has for sometime been confronted with so many and such a wide variety of major problems that to many the question presented by occupational diseases seems comparatively insignificant.

As a result of new and revised legislation, there has been brought about increasing liability to provide compensation for, or pay damages to, the victims of occupational diseases. This problem became, therefore, equally as serious as industries' increased tax rates, unemployment insurance, wages, hours of labor, trade agreements and insurance rates.

Today, intelligent and sincere management are seeking a program which will serve to simplify the problem of industrial diseases by an understandable analysis. The practical approach is through an industrial hygiene survey with a definite procedure for ascertaining the necessary facts which need not cause undue alarm, but instead act as a diagnostic procedure with industrial welfare technique. In other words, an "inventory" of all the hygienic items which enter into the workers' environment, the manner in which he conducts his work, the length of time he spends at each task, materials used, by-products created, etc.

To prevent occupational diseases, permit us again to repeat that one must seek out its sources. These will be found in working conditions and environment, in processes of industry or methods used, and in substances or materials intrinsic to manufacturing. They are usually in the form of dusts, gases, fumes, vapors, mists and fluids.

Successful control of occupational disease hazards requires the intelligent application of medical and engineering principles. To industry, it has proven satisfactory and profitable. To the worker, it has rendered a service of value in reducing absenteeism and promoting better industrial relations.

In any program for the control of occupational diseases, the whole-hearted cooperation and sincerity of the management is vitally essential. This has been our pleasant experience the past two months while making a survey at the Calumet Shops. Such an attitude is highly commendable and speaks well for an intelligent management with able leadership.

We appreciate the fact that industry, in order to stay in business and maintain its position in the economic world of today, must avail itself of all materials and processes which have been shown to increase the efficiency

and speed the output of its production. But, if in the course of such procedure, industry creates hazardous environments, then industry must control them.

The maintenance of one's health is not entirely due to bodily functions, but is often influenced by one's environment as well. The exposures to occupational disease hazards as a contributing cause of the shortened life span of industrial workers in comparison with workers of similar social and economic status must be taken into consideration.

The cost of ill health in industry is almost incalculable. Hardly an illness occurs that does not involve much more than a loss of wages. Illness, not accidents, cause the greatest amount of lost time in industry.

Occupational diseases are not mysterious nor are they a recent development. They are less spectacular than accidents of industrial origin. One can more readily appreciate and visualize a crushed toe, a lacerated scalp, a second degree burn or a fractured arm. Occupational diseases are more subtle, gradual and often masked. In many instances, they are not palpable or direct.

In view of the numerous recommendations made in our report, we wish to also commend the Pullman Company for its sincere attempt in instituting many reforms of health preservation. This endeavor prompts us to classify your plant as above the average. However, the term "average" as herein applied, does not infer any particular degree of perfection in industrial health environment and leaves much to be done in the way of corrective measures.

M. H. Kronenberg, M. D.

M. H. Kronenberg, M. D., Chief
Division of Industrial Hygiene.

SCOPE

The industrial hygiene survey of the Pullman Company consisted of the following studies:

1. An occupational analysis of all operations at the Calumet Shops, the Pullman Laundry, the Central Machine Shops and the Pennsylvania Yards.

2. Sampling the air in the working environment of occupations believed to be potentially hazardous in order to determine the degree of the actual hazard.

3. Chemical analyses of raw materials to determine the presence of toxic ingredients.

4. Velocity readings at locations where exhaust ventilation had been installed, as for example, spray booths and exhaust hoods, so as to test the efficiency and adequateness of the existing control measures.

5. Blood examinations of painters and others having an exposure to lead, as for example, solderers and burners.

6. A five year morbidity study of the Calumet Shops and Pullman Laundry from existing group insurance records.

7. An illumination study of selected workrooms at the Calumet Shops.

8. A survey of sanitary facilities (toilets, showers, lockers) available for employees of the Calumet Shops, Pullman Laundry, Central Machine Shop and Pennsylvania Yards.

9. A bacteriological study of the workroom atmosphere in the upholstery, mattress and feather departments at the Calumet Shops and the soiled linen and press rooms of the Pullman Laundry, to determine the presence of pathogenic organisms polluting the air.

FINDINGS

The detailed findings have been presented in each of the sections of this report, as each section has been treated as a separate entity. However, our general findings reveal the following:

1. The Pullman Company have an occupational

disease problem as shown in Tables I, II, and Figure I, and further substantiated in our findings.

2. No program for occupational disease control is in force at present.

3. Industrial hygiene control measures are generally employed only as the aftermath of an occupational disease claim.

4. That the Engineering department is equipped to handle the major portion of the engineering phase of environmental control measures.

5. A fine spirit of cooperation exists among the foremen due to the administration and leadership of the safety program.

6. The research and testing laboratory could be made available for the chemical determinations of toxic materials.

7. The Medical Department under the capable direction of Doctors Crowder and DeMotte could cope with the medical phase of the occupational disease problem.

RECOMMENDATIONS

The recommendations for controlling the hazardous conditions found are discussed under the various sections of this report in order to completely present the whole study of each condition, that is, a general discussion of the harmfulness of the condition, where it is found and recommendations for its control. The specific recommendations outlined in this report are only suggested recommendations made with the view of servicing the Pullman Company. This division does not have any regulatory power. It functions in an advisory capacity in assisting the industries of Illinois in solving their industrial health problems.

However, as a general recommendation, we suggest that the Pullman Company seek the assistance of this division in setting up a permanent industrial hygiene program in the medical department whose administration will include representation from the Engineering, Safety and Chemical Departments.

TABLE I

NUMBER OF PEOPLE EXPOSED

TO

CHIEF OCCUPATIONAL DISEASE POTENTIALITIES
(Calumet Shops)

Department	Acids Mineral	Alkali	Cyanide	Asbestos Dusts	Silica Dusts	Silicate Dusts	Non-Siliceous Dusts	Organic Dusts	Gas	Dermatitis	Carbon Monoxide Gas	Chlorine Gas	Arsenic	Lead Metals	Fluorides Gases	Other Metals	Nitrous Oxides	Infections	Alcohols, Esters, Ethers	Halo. Hydrocarbons	Lacquer	Sulphur	Oil	Other Solvents	Petroleum	Paint
General Storeroom								9															7			
Bunkroom														6					11		10			11		10
Glass	1	1														1	1		1		1					
Cabinet Woodmill								36						9		1								24		
Carpet room								7										6								
Feather (Upholstery)								2										2								
Cutting (Upholstery)								5		2																
Upholstery								7										62								
Brass	10				3									10												
Brass (Polishing)					6	6	6	6		6																
Plating room	6	6	3										3			3	2					3				
Lacquer																3			3		3					
Cleaning		2																								
Paint Stock room														6										6		6
Truck and Blacksmith									26	1	20					26									6	
Machine Shop						16				12				2		18										
Tinshop		3				6								56				5	3				2		4	
Body		2			2	11	5	16	3		6			12		5		8							37	
Joiner						47		33	1					59		61								37	22	
Platform								1	1							16								4	14	
Paint	1	13			7	27								51		1			12		13		12	61	3	62
Steam		15		15					30	94				30	30	16				30				16		
Power, Light & Maintenance	3	8		3		5			3	3	3			5						3					8	
Machine																								5	5	
Power Plant						8																				
Electric		1								1				45					1	6				6		6
Battery	4	3												4											3	
Store 112				1				11										10							11	
Yard Gang	4	2			41							2		38		35									1	
Salvage																3										

TABLE II

NUMBER OF PEOPLE EXPOSED

TO

CHIEF OCCUPATIONAL DISEASE POTENTIALTIES

(Central Machine Shop)

Department	Acids Mineral	Alkali	Cyanide	Asbestos Dusts	Silica Dusts	Silicate Dusts	Non-Silicious Dusts	Organic Dusts	Gas	Dermatitis	Carbon Monoxide Gas	Chlorine Gas	Arsenic	Metals Lead	Metals Fluorides	Gases Other Metals	Nitrous Oxides	Infections	Alcohols, Esters, Ethers	Halo. Hydrocarbons	Lacquer	Sulphur	Oil	Other Solvents	Petroleum	Paint
Carpet Cleaning		1			1	1										1					1			2	1	
Main room								1	3							35								32		32
Carpet						1		1										1								

(Pennsylvania Shops)

Shops	1	26	4		17	21		4						5					5	2	6		19	9	25	4
Linen																		10								

(Pullman Laundry)

Platform											4							4								
Blanket		2						2										2								
Soiled Linen		1						7				1						7								
Power and Maintenance		1				1		4	3	4				4		4		4			1			1	1	
Wash and Finish												4						4								

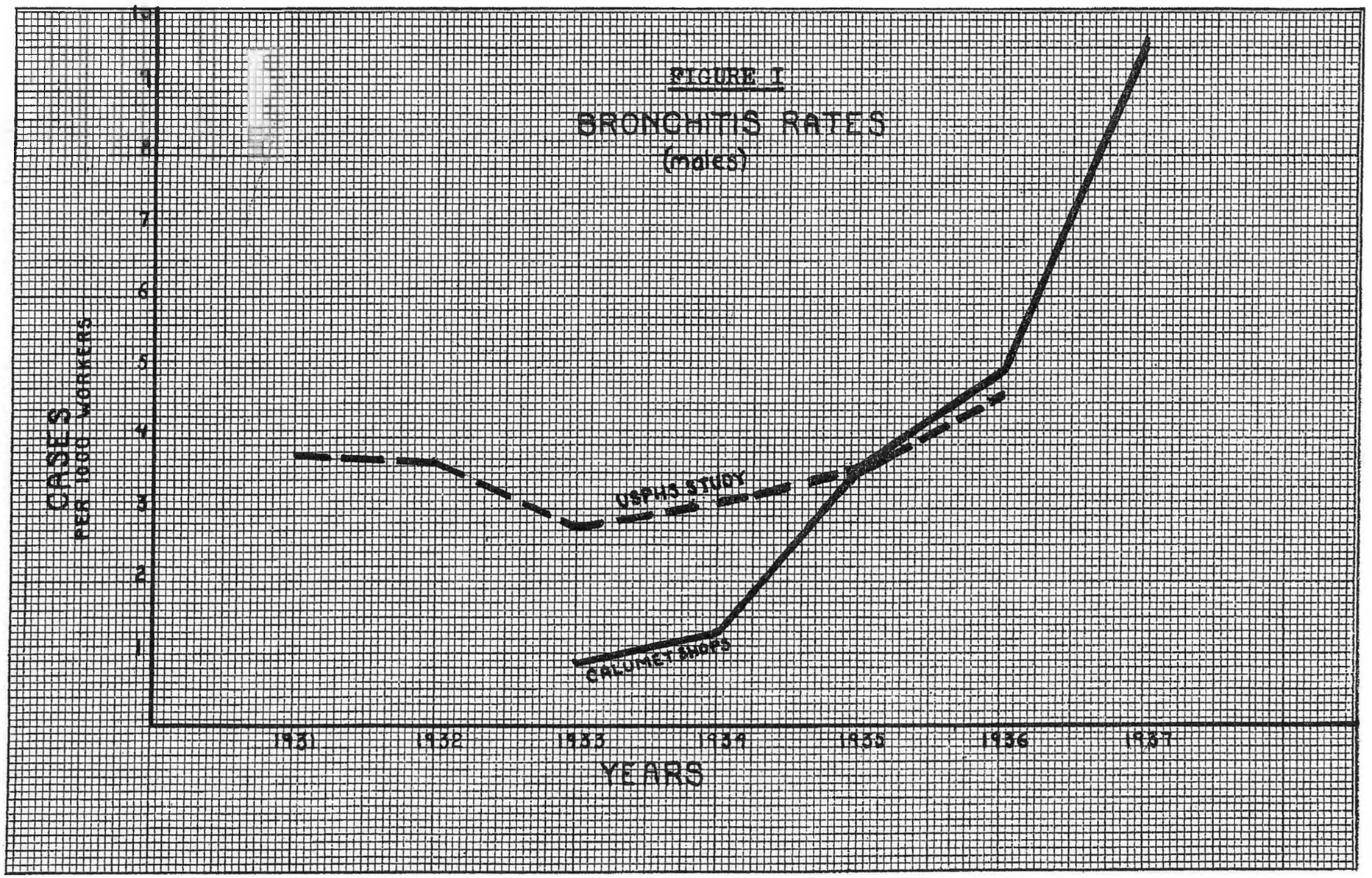


FIGURE I
BRONCHITIS RATES
(males)
CASES
PER 1000 WORKERS
8
7
6
5
4
3
2
1
USPHS STUDY
CALUMET SHOPS
1931
1932
1933
1934
1935
1936
1937
YEARS

CONCLUSION

One of the most active fields of labor legislation today is that of occupational disease legislation making industry directly responsible for the health of its workers. Plants employing large numbers of men have a responsibility not only for the health of its employees but in some measure to society for the health of the community from which it draws its workers.

No industrial welfare program is complete unless it includes an industrial hygiene program, for surely, the same motives that actuated industry's energetic safety program are sufficient for the promotion of an industrial health program.

It seems paradoxical that management should go to extremes in designing and maintaining machines for maximum mechanical efficiency, yet operated by workers in poor health and operating at low efficiency due to unfavorable working environments. Expenditures for health of workers returns to management an equal, if not greater return on its investment than its safety expenditures.

Surely the same safety and comfort extended to passengers for which the Pullman Company is renown, should be reflected back into the workshops of these men who made this so completely possible.

DUST

There is no direct medical answer to the problem of dust harmfulness today since all dusts are disagreeable. Experts have debated this problem for several years until at times a state of confusion existed in the minds of those directly interested in the problem. However, it may be said that inorganic dusts are by far more injurious than organic dusts, excluding toxic dusts. The generally accepted opinion is that some inorganic dusts are able to penetrate deep into the lung tissues and are sufficiently insoluble to be retained there. Some may become active in the body tissues, causing definite and permanent injury when complicated by infection. Some are inert and may be retained for years without apparent serious damage although showing an alteration in the pulmonary tissues, while others are gradually absorbed without causing pathological changes. Two specific dusts causing the greatest pathological change and disability if inhaled in sufficient quantities over a sufficient period of time are silica and asbestos - both of which were found in the Calumet Shops. It is not particularly a question of silica or asbestos dust and excluding the others as harmless, because there is evidence that excessive dustiness of any kind is harmful. The harmful effect is not necessarily confined to the lungs, as some kinds of dust are known to have detrimental health effect on the nose, throat and bronchial passages and indirectly on the heart and stomach. Apparently innocuous dusts may produce reactions in persons of peculiar personal susceptibility. We speak of such persons as being allergic. When the respiratory tract is involved they develop such disease known as asthma.

From the viewpoint of respiratory harmfulness, it is generally accepted that the particle size of dust that will affect health adversely upon entering the lungs, are those less than 10 microns in size. (One micron equals 1/25000 of an inch). It would be well to bear in mind that men working in industry trades suffer far more from respiratory disorders of all kinds than do non-industrial workers.

So much for the technicalities of dust. Management is more interested in what it is likely to be confronted with at present and in the future in regard to compensation and other obligations as a result of industrial dust exposures. Compensation is payable for one or more dust diseases in 13 States and the District of Columbia, although Occupational Disease Laws are in effect in 21 States. Occupational Disease legislation is one of the most active fields of labor legislation today and if it progresses in the next five years at the rate it has progressed in the past five years, we will shortly have this type of legislation on the status books of all major industrial States. It is interesting to note that the dust diseases are most prominent in this type of legislation. Factory laws are being amended with more stringent regulations for the

removal of industrial dusts at its source.

The plant executive should look today not at the medical aspects of dust inhalation and thereby try to establish a weighted dust control program, based on the degree of hazard associated with various dusts, but at the interpretations of workmen's compensation administrators and the suits at common law. The courts and compensation boards are not too greatly impressed with attempts to explain the harmfulness of 20 or 60 per cent silica. They have before them a man whose health has been impaired. Evidence, both pro and con, is often confusing, therefore, the benefit of the doubt is given to the worker and justly so, if it is established that he has an alleged pathological condition which can be associated with dust exposure, even though it may be associated with other causes. As an example of this, we have only to study the compensation claims of the State of Illinois in the year and a half under the new Occupational Disease Act. Under this Act, claims for respiratory diseases of all types have been filed for compensation, including such disorders as tuberculosis, pulmonary tuberculosis, silicosis, cement poisoning, asbestosis, bronchial asthma, pneumoconioses, chronic bronchitis and pneumonia. A compensated case of dust disease may cost management anywhere from $2500.00 to $5000.00. This is not an exception to workmen's compensation administration procedure, as all States are similarly interpreting occupational diseases due to dust and particularly those States who have an "all inclusive" act.

In view of these facts, it would appear that the industrial executive, who is attempting to balance his humanitarianism towards his employees with his desire to save his organization from avoidable expenditures because of dust hazards, would do well to disregard technicalities and concentrate on reduction of all dusts in and around his plant, irregardless of the type of dust.

DUST FINDINGS

After viewing all the operations in your plant, it was decided to take air samples for dust determinations in the sand blast room of the brass department; inside the brass department sandblaster's helmet; at various locations in the stall shop; in and about the outside car sandblasters; in the polishing room of the brass department; in the truck shop for general air dustiness; at hand sanding and stripping operations in the stall shop; at the grinding and sawing operations of the tin department of the stall shop; and at the pipe covering stripping operations in the steam department of the stall shop. The results of these determinations are represented in the Table III.For the purpose of

TABLE III

DUST DETERMINATIONS

No.	Dept.	Time	Location	Dust Data		
				Type	Total No. of particles per c.f. of all dust	% under 2 microns
1	Brass (sandblast)	1-17-38 (A.M.)	Between cabinet door and tumbling barrels. Windows and wall louvres open. Cabinet door open for total of 14 mins. in loading and unloading.	Silica	1,518,400	83%
2	Brass (sandblast)	1-17-38 (A.M.)	Same as above. Cabinet door opened for total of 9 mins. in loading and unloading.	Silica	960,000	82%
3	Brass (sandblast)	1-17-38 (A.M.)	Same as above with all windows and wall louvres closed for 15 mins. before and all during sampling. Cabinet door opened for total of 5 mins. to load and unload.	Silica	1,954,700	84%
4	Brass (sandblast)	1-27-38 (P.M.)	Inside helmet of sandblaster while working in cabinet.	Silica	370,500	75%
5	Stall Shop	1-17-38 (A.M.)	In middle aisleway about 25 feet from man repairing water case and 20 feet from man swabbing ducts with oxalic acid (Room #1)	Silica Metal Organic	1,374,000	85%
6	Stall Shop	2-1-38 (A.M.)	Inside car while being stripped (Room #1)	Inorganic Organic Silica	6,319,400 2,900,000	59%

TABLE III

Dust Determinations (Cont'd)

No.	Dept.	Time	Location	Dust Data		
				Type	Total No. of particles per c.f. of all dust	% under 2 microns
7	Stall Shop	2-15-38 (A.M.)	Inside car while being stripped. (Room #1)	Inorganic Organic Silica	20,892,000 5,220,000	46%
8	Stall Shop	2-15-38 (A.M.)	Outside car in which #8 sample was obtained and 10 mins. later	Inorganic Organic Silica	3,142,000 817,000	71%
9	Stall Shop	2-15-38 (P.M.)	At last aisleway, near office and about 10 feet behind duplex grinder in tin department	Inorganic	6,180,000	55%
10	Stall Shop	2-15-38 (A.M.)	In tin department beside man operating band saw on 1/8 inch primer coated steel plate	Metal	2,580,000	77%
11	Stall Shop	2-1-38 (A.M.)	In steam department beside man mixing asbestos pipe covering	Inorganic Asbestos	6,594,000 3,300,000	67%
12	Stall Shop	2-1-38 (A.M.)	In steam department, under car while men are stripping pipe covering	Inorganic Silica Asbestos	27,012,500 4,750,000 8,000,000	42%
13	Brass Polishing	1-26-38 (A.M.)	Man polishing door treads with emery coated wheel on wheel in front of window.	Metal Emery	2,500,000	73%

TABLE III

Dust Determinations (Cont'd)

No.	Dept.	Time	Location	Dust Data		
				Type	Total No. of particles per c.f. of all dust	% under 2 microns
14	Brass Polishing	1-26-38 (A.M.)	General room air between the two doors.	Inorganic	701,000	80%
15	Yard	1-21-38 (A.M.)	On sandblast track. At north end 12 feet from middle car shop side wind = N.E.	Silica	5,008,000	63%
16	Yard	1-21-38 (A.M.)	Same as #15, inside car while being swept up after blasting - wind = N.E.	Silica	2,500,000	53%
17	Yard	1-21-38 (A.M.)	Same car as in #16, but during blowing out of crevices and corners after blasting.	Silica	22,000,000	64%
18	Yard	2-14-38 (A.M.)	Outside sandblasting of cars. At north end of 2nd car on boardwalk. Men at this end.	Silica	4,440,000	66%
19	Yard	2-14-38 (A.M.)	Same as #18 but in middle of car on boardwalk. Wind =N.W	Silica	1,050,000	40%
20	Yard	2-14-38 (A.M.)	About 20 feet in front of sand shed, on boardwalk, at end of car.	Silica	7,028,000	76%
21	Truck	1-27-38 (P.M.	General air of truck shop	Inorganic	738,700	68%

interpretations, it is necessary to know that at present 5,000,000 particles of silica dust per cubic foot of air is definitely known to be hazardous and that particles of dust of a size less than 10 microns are most likely to enter the lungs. However, it is well to repeat here that compensation boards are not too impressed by the technicalities of dust and that any heavy dust concentration is liable to cause difficulty to management.

Brass Department:

1. We found that the dust control system in the sandblast room in the brass department has been well designed and that no silicosis problem will present itself if present conditions are maintained.

2. We found that the polishing room was well controlled except when polishing brass door treads. In this case, the hood design is too small to allow the dust liberated to be collected.

3. Our survey revealed a very fine dust control design in the brass sandblast room. If the dust in this room can be so well controlled, then the same measures can be used to solve any other dust problem in the Pullman Company. Further highly commendable dust control measures are the exhaust systems employed in the wood shop and the brass polishing room.

Stall Shop:

1. We found that the contamination of air in the stall shop is due to the stripping operation in the cars, the steel saw in the tin department, the duplex grinder in the tin department, and stripping of pipe covering in the steam department. Both of these stripping operations are the greatest sources of dust and present a serious dust hazard to the men doing this work, particularly since no protection is afforded. Fortunately, these operations are intermittent. If they were continuous, the entire stall shop would be seriously affected.

2. We found that in some of the various departments at Calumet and the Central Machine Shop, grinding wheels are in use.

Some of the wheels have no control for the liberation of the dust but the majority of them have an exhaust pipe which depends upon the rotation of the wheel for its suction and a water tank as a means of collecting the dust drawn through the pipe. In the first place, the pipe ends a few inches from the surface of the water in the tank, thus greatly reducing the efficiency of collection by a method that is fundamentally poor. In the second place, the suction is inadequate, and in the third place, several of the exhaust pipes are practically clogged with dust.

Cabinet Shop:

1. We found that a disc grinder was used intermittently and that the operators wore respirators that were not approved for the type of dust dispersed into the atmosphere.

Yard:

1. We found that car sandblasting created a hazard in the immediate environs of this operation. As far as the car blasters are concerned, they are adequately protected by positive pressure helmets. However, the laborers loading the tanks and wheeling sand from the sand house to the tanks wear only respirators. In regard to these respirators, it has been found that they are not approved by the U. S. Bureau of Mines for silica dust. A respirator should have this stamp of approval to be effective. It was also noted that these laborers are not too adherent to the regulation of wearing respirators, chiefly because their glasses steam up and that the respirators are not comfortable, nor do they fit well. Both of these objections may be partly overcome by investigating some of the most recent approved respirators.

2. We found that the carpet cleaner's helmet was not of the approved type. While it is true that if a sufficient pressure is maintained in the helmet no dust will enter, it would be quite difficult to build up a sufficient pressure under the conditions found without subjecting the man to discomfort due to the high velocity of air necessary. Furthermore, with a wind blowing

into the man's face as quite often occurs, the efficiency of the helmet would be reduced.

3. Operations in the salvage hut created considerable dust, especially when cleaning window car screens.

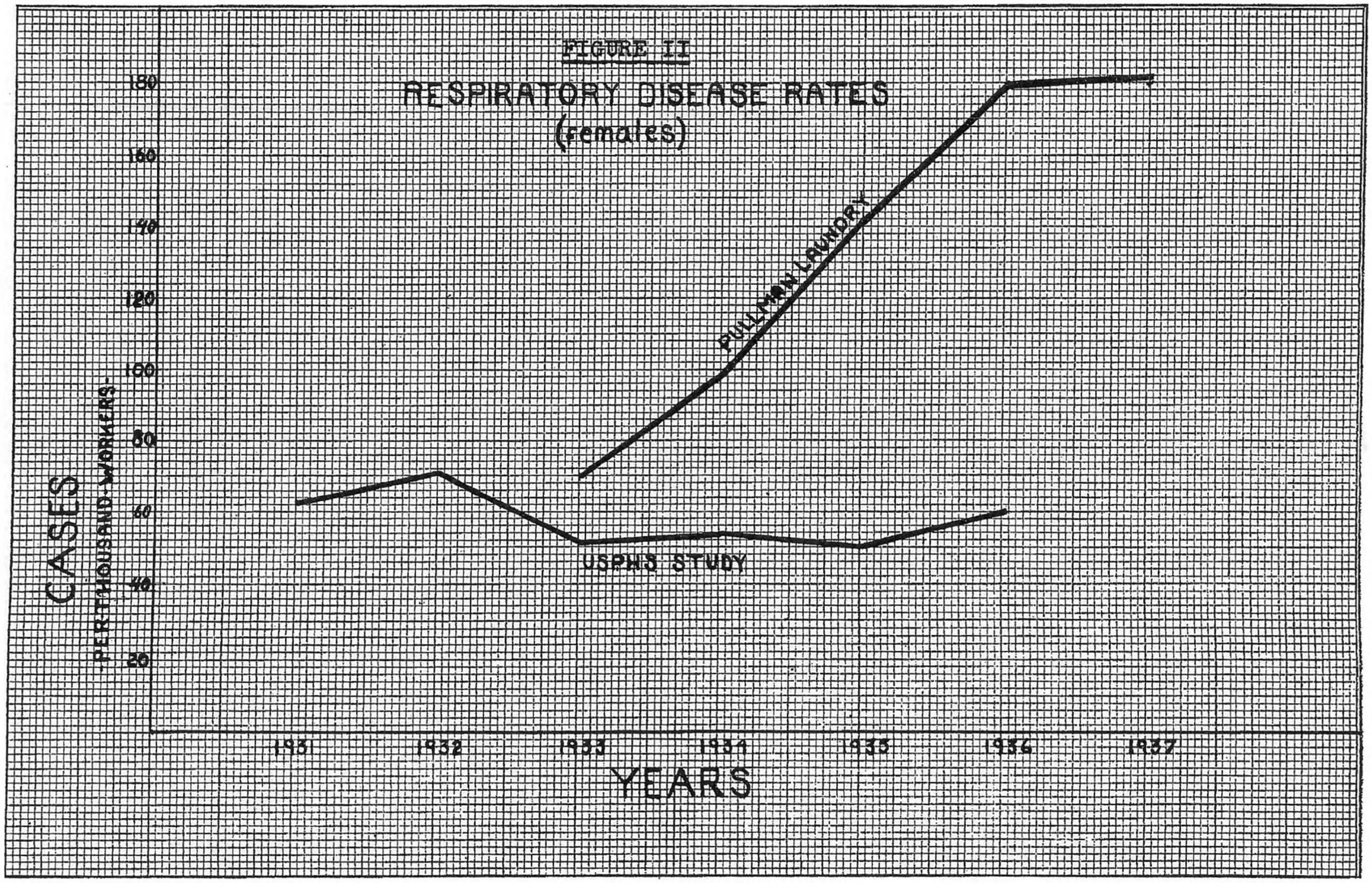
Pullman Laundry:

1. The soiled linen room at the Pullman Laundry was too dusty. Although the dust is chiefly organic, nevertheless, the fact that all the workers are negresses and the negroe race is noted for its high incidence to respiratory diseases, are facts that accentuate the problem. An analysis of the group insurance records, as revealed in Figure II, definitely demonstrates this fact. Added to these facts is the potential bacterial infection from the dust of the dirty linen which may easily carry bacteria from the various individuals using this linen. It is quite possible for tuberculosis to be carried to the laundry from the infected individuals passing through Chicago on their way to Colorado and Arizona. Because of this reason, air samples were taken in the laundry, upholstery, mattress and feather rooms at Calumet to determine bacteria in the air. These revealed a high count of organism in the air of the sorting room at the laundry and the feather room at Calumet which on plating and smear were characteristic of streptococci and, therefore, potentially pathogenic under certain conditions. Although tubercle bacilli should be considered of paramount importance, they could not be plated on cultures for easy recognition. It would necessitate animal inoculation which would occupy a two month study in itself.

   We are not saying that there is a definite tuberculosis or other infectious disease problem from the bacteria in the air of these rooms for a much more detailed study of this problem would be necessary. However, we do mean to point out that there is a potential problem and respirators as recommended should be worn until a further detailed bacteriological study can be made.

FIGURE II

RESPIRATORY DISEASE RATES
(females)



RECOMMENDATIONS

It should be remembered when faced with any dust problems that control must depend upon the application of several basic measures. These are:

1. Local exhaust ventilation
2. Isolation of the dust process
3. Wet methods
4. Substitution of less hazardous or non-hazardous materials
5. Personal protective equipment as respirators and pressure helmets
6. Good housekeeping

Our recommendations for the control of dust are as follows:

Engineering

Stall Shop:

1. All stripping operations should be carried on outside the shop, somewhere in the yard, with the provision that all strippers wear respirators approved for silica dust. Furthermore, that these respirators be cleaned daily and properly maintained.

2. Respirators approved for silica and asbestos dusts be given to the pipe covering strippers in the steam department and that these respirators be cleaned daily and properly maintained.

3. The pipe covering strippers use water to soak the covering before starting to remove it and frequently thereafter while stripping.

4. Mechanical exhaust be installed on the duplex grinder in the tin department which will exhaust to a dust collector. Similar mechanical exhaust should be installed on all grinding wheels in this shop that are used to any extent.

5. Men sweeping out the cars wear approved respirators, if they have daily sweeping to perform, and apply wet methods.

6. Several roof ventilators of the rotary type be installed.

7. That an approved respirator be used when mixing asbestos for pipe covering.

8. That the operation of removing tank covers be conducted outside the stall shop.

9. That the laborers sweeping floors, wear approved respirators and that all sweeping be done wet if possible.

10. That the band saw operators in the tin department wear an approved type respirator.

11. That the removal of iron tanks, boxes, etc. now done by the Underneath Men of the body department, be conducted on the outside.

12. That the floor men of the body department wear approved respirators for dusty operations.

13. That the roof men in the body department wear approved respirators when removing insulation.

14. That joiners and helpers wear approved respirators when working at dusty operations.

15. That a cement pit be made for the blower in the paint department, who works in the yard at the east end of the stall shop, for operations that require him to get under the car.

16. All asbestos be purchased in paper bags to reduce the dispersion of dust during handling in sacks.

Brass Department:

1. That the exhaust hood on one of the polishing wheels be redesigned to effectively catch and entrain the dust liberated when polishing door treads, and that this type of work be delegated to the operator of that wheel.

2. That the exhaust systems on the polishing wheels and in the sandblast room be inspected monthly for leaks, loading of pipes, and the efficiency of the system.

Truck and Blacksmith:

1. That several roof ventilators of the rotary type be installed.

Wood Shop:

1. That the exhaust system on the wood working machines be inspected bi-monthly in order to maintain its present efficiency.

Cabinet Shop:

1. That the portable disc grinder now being used in the small storm-door space be brought into the room and a small room be built for it in one corner. Also that approved respirators be worn by the men.

Mattress Room:

1. That the hood over the feeding table to the picker be lowered as far as possible without interfering with the feeding operation. (Plate I)

2. That the exhaust system of the picker be redesigned with larger pipe sizes and greater suction. It may be possible to speed up the fan and thus obtain a greater velocity at the points of dust generation.

3. That all mattress workers wear respirators of a type similar to the Martingdale respirator and that two filter changes be made daily.

Feather Room:

1. That the feather cleaning machine be altered to allow operation without liberating dust into the room.

2. That a hood, with mechanical exhaust, be installed over the feeding side to allow filling the machine without liberating too much dust into the atmosphere.

3. That better housekeeping method be employed which will eliminate the accumulation of feathers on the floor, particularly under the hoppers.

Yard:

1. That all men working about the sand-blasting operations rigidly adhere to the wearing of either approved respirators or positive pressure masks.

2. That the carpet cleaner wear a positive pressure mask as recommended for car paint sprayers.

3. That no one enter the sandblasting immediate area without wearing a respirator irregardless of his position in the company.

4. That a new building be erected to replace the present salvage hut. (See Plate II). That the scrap material pile and screens be wetted to prevent the liberation of dust.

5. A bin be built in the sandhouse at a sufficient distance from the floor to allow filling wheelbarrels from a hopper and so eliminating hand shoveling.

Central Machine Shop:

1. That an exhaust system with a suitable dust collecting device be installed on the large grinding wheel beside the welder.

2. That the work done in the balcony of the main room be transferred to the second floor.

Laundry:

1. That the employees in the sorting room wear respirators of the Martingdale type and that the filter be changed twice daily.

Pennsylvania Yard:

1. That the strippers wear approved respirators when blowing out the cars.

2. That all sweeping and brushing inside cars be done with vacuum cleaners in so far as practicable. If this is impossible, approved respirators and wet methods be employed.

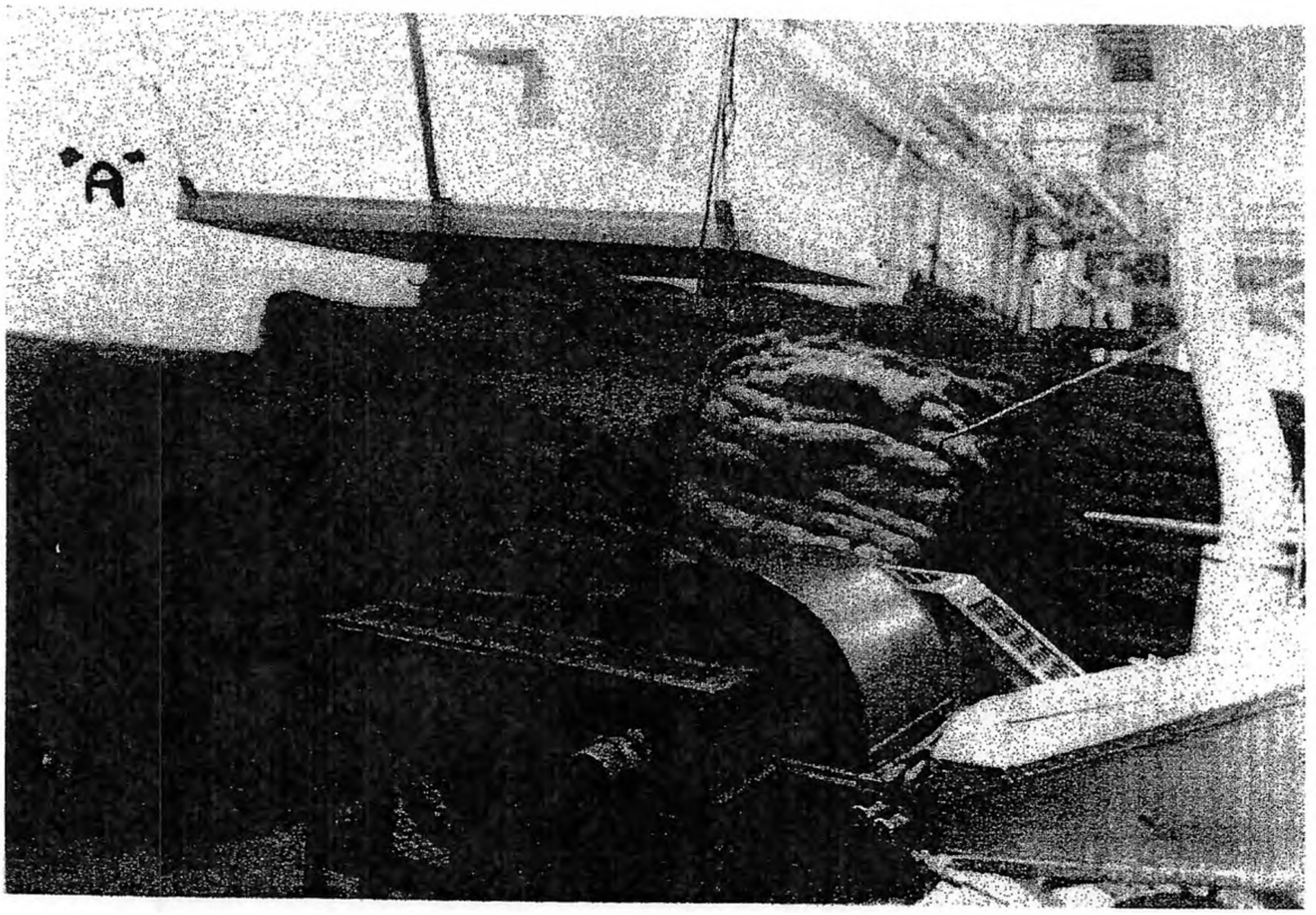
MEDICAL

The medical recommendations are as follows:

1. That semi-annual physical examinations and chest x-rays, in accordance with American Public Health Association recommendations, be given to all sandblasters, sandblast laborers and others who are known to have a heavy dust exposure.

2. All claims under the group insurance plan for respiratory diseases be studied to ascertain if the source be of occupational origin.

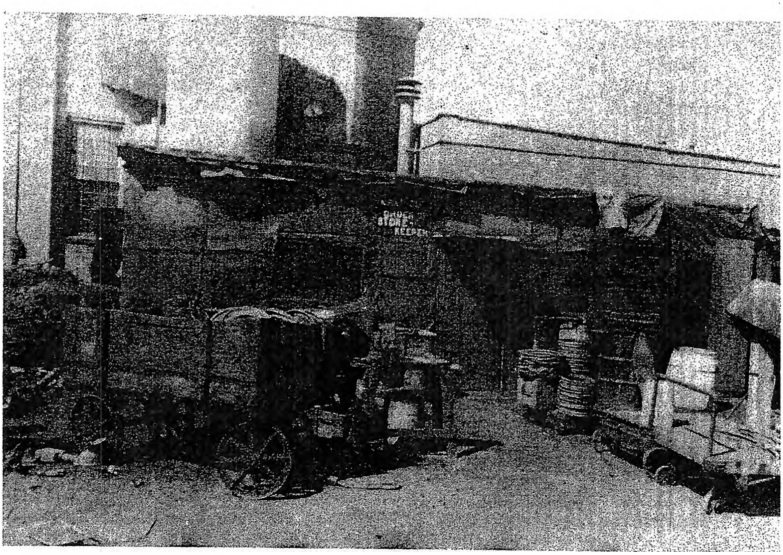
PLATE I



Hood "A" should be lowered.

PLATE II

SALVAGE HUT



More suitable housing facilities should be erected.

LEAD

Epidemics of lead poisoning have occurred from time to time and bear witness to the omnipresence of lead and to the strangeness of the circumstances under which it may manifest itself. No single sign or symptom may be considered diagnostic of lead poisoning. Many conditions may influence the reaction of the tissues to lead, so that personal and physical factors may affect its response. It is obvious to those acquainted with this problem in industry that efforts to reduce the incidence of industrial lead poisoning will be greatly handicapped if emphasis is not placed on such observations as may be considered presumptive evidence of lead absorption and lead intoxication. Lead poisoning is always preceded by a stage of lead absorption, but lead absorption is not always followed by lead poisoning. The worker may still be on the job and free from symptoms during the stage of absorption so that much success in prevention can be secured by detecting these individuals.

Symptoms from lead poisoning may present themselves long after the exposure has terminated. The basophilic aggregation test should be helpful in this type of prevention in those exposed to lead. The intoxicating effects of lead characterized by its many toxic episodes may be so slow in developing that, any method, which will reveal the incipient stages of this industrial intoxicant, is, therefore, highly desirable. The industrial hygienist and physician can render a more efficient and commendable service to industry if those exposed to lead can be picked out before the more dangerous and obvious manifestations overtake the worker. The committee on lead poisoning of the American Public Health Association in October, 1929, gives an excellent discussion on the subject of standards of diagnosis based particularly on the degree of disability indicated by certain groups of signs.

It is realized that much of the confusion existing in the ranks of the medical profession regarding the diagnosis of industrial lead poisoning, its degree and the amount of disability, was due to a lack of uniformity in the terminology used to express opinions. We wish to emphasize the necessity of obtaining complete occupational and medical histories and the consideration of all such information as may be gained from them, along with the results obtained from careful physical examinations and laboratory studies. It is said that lead, per se, does not result in death. It is felt that true cases of lead poisoning merely "knocks one down" and it is usually something else that "carries the worker out", as for example, nephritis.

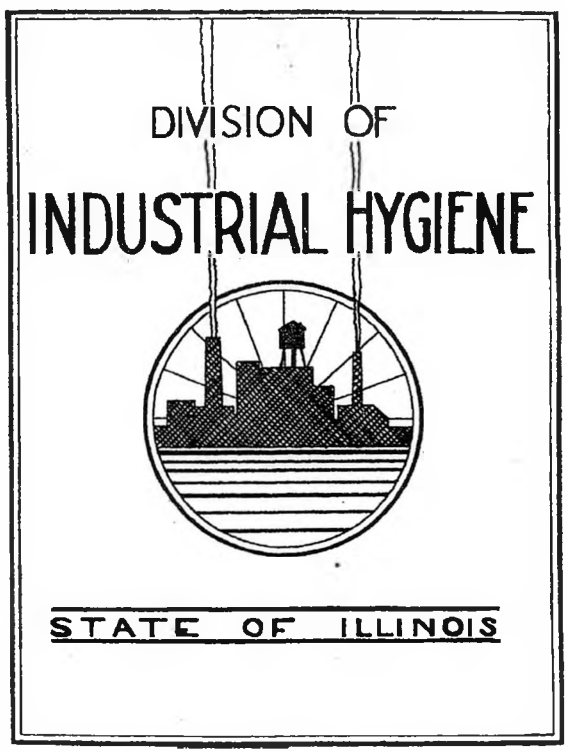
The chief source of lead poisoning is by inhalation of lead dust and fumes. However, lead poisoning by ingestion and absorption are important enough as a causative factor to be carefully considered in any preventive program.

INDUSTRIAL HYGIENE SURVEY

OF

PULLMAN-STANDARD CAR MANUFACTURING COMPANY

PULLMAN CAR WORKS



STATE OF ILLINOIS
DEPARTMENT OF PUBLIC HEALTH
A. C. BAXTER, M. D., *Acting Director*

PREFACE

It was the plan of this Division to conduct a complete medical and engineering study of the working environment. However, shortly after the start of the study, production schedules dropped sharply until the plant was practically shut down. This made it impossible to study all operations.

Unless normal working conditions are viewed and appraised, there is always danger of misinterpreting a condition by assuming too much or too little. Therefore, our study is not as complete as we had hoped. Nevertheless, we do feel that enough was surveyed to enable us to submit an appraisal of the health status in various manufacturing operations of your company.

At some later date, when production is once again near normal, we hope to be invited to study the operations not covered in this study so that a complete appraisal may be submitted of the health conditions in the working environment of the Pullman-Standard Car Manufacturing Company.

STATE OF ILLINOIS
HENRY HORNER, GOVERNOR
DEPARTMENT OF PUBLIC HEALTH
DIVISION OF INDUSTRIAL HYGIENE
1800 FILLMORE STREET
CHICAGO

ASSISTANT DIRECTOR
A. C. BAXTER, M. D.

M. H. KRONENBERG, M. D.
CHIEF OF DIVISION AND
INDUSTRIAL MEDICAL SUPERVISOR
PHONE SEELEY 1463

ACKNOWLEDGMENTS

This report is the result of a cooperative environmental health study of the worker. In such a study, the cooperation of management and labor is the most important requirement. Without this, conditions may be overlooked because they may not have been evident at the time the working environment was studied. It was, therefore, necessary to bring to our attention all operations which management and labor feel are, or maybe, harmful. This has been our pleasant experience at the Pullman-Standard Car Manufacturing Company, through the active and sincere interest and cooperation of Drs. DeMotte and Sutch, and Mr. Brand.

M. H. Kronenberg, M. D.

M. H. Kronenberg, M. D., Chief
Division of Industrial Hygiene.

K. M. Morse

K. M. Morse,
Industrial Hygiene Engineer.

INTRODUCTION

Today, as never before, there has been an acute awakening to the need of reasonable and adequate medical care for all. Very recently it has been emphasized that nothing is more important to a nation than the health of its people. Therefore, it is proper to conclude, from an industrial viewpoint, that nothing is more important to management than the health of its workers. If this be doubted, management has only to think in terms of work spoilage, reduced production, low plant morale and in the end disrupted industrial relations. These and many more have a direct bearing to poor health.

While industrial sickness rates in this country are extremely meagre, mortality rates on the other hand definitely bear out the effect of poor working environment. The National Tuberculosis Association has shown that for tuberculosis the death rate for the semi-skilled worker is 290% greater than in the professional group and 600% greater in the unskilled group. One of the main reasons leading to comparative failure in public health programs is that they have overlooked a major source of poor health, namely, the industrial environment. Most efforts have been directed toward infant and young life, with comparative neglect of the adult population. In other words, public health must be brought into the factory if we are to really attack the problem of the health of our industrial population which chiefly comprises our adult population.

As a result of new and revised legislation, industry has been confronted with an increased liability in regard to the health of its employees. This has been brought about through occupational disease laws which are of such great variance that attempts to measure industry's obligation has indeed been difficult. Those managements who are attempting to meet their obligations in caring for the health of their employees are finding it more and more evident that the term "occupational disease" is misleading. Under the workmens' compensation laws, in many States, any disease may be termed as occupational if some abnormal condition in the working environment can be associated with the disease, as for instance, abnormal temperatures, dampness, dusts, gases and the like, even though such disease may be common to the general population. Therefore, progressive managements now realize that it is advantageous to reduce sickness and disability among its workers whether or not of occupational origin.

Diminished or defective production, idle equipment and discontented workers which are results of ill health are today measurable in dollars and cents, whereas years

ago they were intangibles which interested only the humanitarian employer. Today, American workmen are displaying widespread interest in all matters pertaining to health. Through union activity, they are becoming health conscious and it is rare to find workers and management meeting for collective bargaining without the question of a healthful working environment being a paramount issue. Workers, in some cases, are more alert to the hazards of occupation than management.

Industry, in order to maintain its position in the economic world of today, must avail itself of all materials and processes which speed production. It is agreed by those who have studied this problem that it is good business to maintain healthy workers for it is through their efforts that the quality and efficiency of production is increased and waste reduced. It does seem that industry must realize after years of striving towards designing machines of high efficiency that the overall efficiency of production depends as well upon the human machine. If a real efficient production is to be attained, more emphasis must be placed on the human machine since in an environment of dust, fumes, gases, abnormal temperatures, etc., its efficiency is low.

Today, intelligent and sincere management is seeking a program which will serve to simplify the problem of industrial health and welfare by an understandable analysis. The practical approach is through an industrial hygiene survey with a definite procedure for ascertaining the necessary facts. These facts need not cause undue alarm, but instead act as a diagnostic procedure with industrial welfare technic. In other words, an inventory of the hygienic conditions of the workers environment. These include the number and sex of workers in each occupation, the length of time spent on a particular operation, the materials used, the by-products created and the health measures afforded. All this supplies the basic data necessary for appraising the health status of the working environment. The successful control of the health hazards detected rests in the intelligent application of medical and engineering principles with the wholehearted cooperation and sincerity of management.

Throughout the entire period of our survey, one feature of the welfare program of the Pullman-Standard Car Manufacturing Company stands out. This was the very intelligent, sincere, and foresighted medical program conducted under Dr. DeMotte. The results of his work are everywhere evident and there can be no doubt of the value of his department, both from a financial and industrial relations viewpoint. His department though appears to be hindered by

the lack of adequate space and laboratory personnel which, if added, will produce a return well worth its investment and above all, assure management that its health program is modern, intelligent, enlightening and meeting its obligations to its workers.

M. H. Kronenberg, M. D.

M. H. Kronenberg, M. D., Chief
Division of Industrial Hygiene.

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INDUSTRIAL HYGIENE SURVEY OF THE

PULLMAN-STANDARD CAR MANUFACTURING COMPANY

PULLMAN CAR WORKS

SCOPE

The industrial hygiene survey of the Pullman-Standard Car Manufacturing Company, consisted of the following studies:

1. An occupational analysis of all operations at work at the time of the survey, and included the following departments and workrooms:

   Iron Department:
   - Truck
   - Wheel and Axle
   - Die and Tool
   - Iron Machine
   - Forge

   Brass Department:
   - Foundry
   - Pattern
   - Polishing
   - Finish

   Steel Cabinet:
   - Machine
   - Building No.6 (Bunk Room)

   Upholstery Department:
   - Mattress Room
   - Feather Room
   - Building 203 (Paint)

   Passenger Steel

   Passenger Finish
   - Car Painting
   - Bunk Room

2. Air sampling for dust and bacterial polution of operations which appeared potentially hazardous.

3. An eight year statistical study of the sickness records for years 1929-1936 inclusive.

4. Checking the effectiveness of spray booths, buffing and grinding wheel exhaust velocities for the removal of dusts and vapors.

5. Analyses of all paints, knifing compounds, lacquers and thinners for the determination of lead or benzol.

6. Blood tests, on approximately thirty-five painters, for lead absorption or intoxication.

FINDINGS

In this limited survey which was due to a severe drop in production schedules, we are nevertheless able to present some important findings. These are chiefly presented in the various sections of this report in order that each subject may be treated as a separate entity with the findings and consequent recommendations.

However, the general findings are as follows:

1. The cooperation of the Safety Department and the Medical Department has been admirable in their efforts to prevent heavily leaded paints from being used in plant operations. The results of these efforts have been successful and highly encouraging.

2. The Medical Department is handicapped by the lack of adequate personnel, equipment and space for the necessary study of the raw materials, processes, working environment and the health status of workers. It is only through such a study, carried out as a routine measure, that health hazards can be detected before any real health impairment occurs with the consequent financial loss to the company.

3. The proper maintenance and care of respiratory protective devices is generally lacking.

4. Adequate engineering control of dust and maintenance of existing exhaust ventilation measures is lacking.

5. Sanitation facilities are fair but there is a lack of sufficient showers and eating quarters where workers may relax and eat.

6. No statistical study is made of sickness records to ascertain the location and extent of possible sources of ill health.

7. The Medical Department with its limited personnel makes it necessary that most of its efforts be devoted to pre-employment examinations, periodic examinations, consultations and accidental injuries. This results in too little time being devoted to illness producing factors which are more important as a cause of lost time.

RECOMMENDATIONS

The recommendations for controlling the specific hazardous conditions found are presented in the various sections of this report in order that each condition with recommendations for its control may be concisely and clearly outlined.

The recommendations made must only be taken as suggestions which this Division presents with the intent of being of assistance to the Pullman-Standard Car Manufacturing Company. These recommendations can be followed in their entirety or in part. This Division has no regulatory power

and functions only in an advisory and fact finding capacity to assist those interested in determining and controlling industrial health hazards. It is only through such a program that voluntary cooperation will result and produce effective control measures.

As general recommendations, we present the following:

1. That the Medical Department secure the services of an industrial hygiene engineer and chemist, to allow the complete appraisal of all health problems. This should consist of -

   a. Monthly blood examination of all painters and others using organic solvents or lead or its compounds.

   b. Ventilation study and effective design of ventilation measures for the control of atmospheric polution.

   c. Illumination study of work rooms.

   d. Chemical analyses of paints, lacquers, thinners, oils, knifing in compounds, and other raw materials for lead, benzol and other toxic ingredients.

   e. Routine air sampling of operations liberating dust fumes, vapors and gases, to determine the degree of hazard.

   f. Engineering study and control of health hazards.

STUDY OF SICKNESS RECORDS.

The solution of the problem of protecting the worker's health must be based upon a knowledge of the factors and locations where health is menaced. In other words, before control measures can be instituted, we must first know the types of disease causing ill health, the relationship of occupation to these diseases, and the causative factors responsible for poor health. This is basic in order to ascertain the character and size of the problem so that remedial measures may be effectively directed in the most economical way. This information can only be obtained from a thorough study of adequate sickness records. Adequate sickness records will reveal the department and occupation in which an illness occurred, the clinical aspects or diagnosis of the illness and the time lost for each illness. Through the analyses of adequate sickness records, it is possible to obtain information concerning the health status of workers and so point out the physical deficiencies in the health assets of the plant.

It is important for any medical director and executive responsible for the workers' health to have before him, as an annual study, the following data:

1. Number of cases of each illness occurring in the entire plant and each department with the total days lost for each type of illness.

2. The company's sickness experience over a period of years in comparison with other industrial sickness experience, particularly the data from the U. S. Public Health Service on industrial illness.

3. Both the direct and indirect cost of illness together with the expenditures for maintaining the health of workers.

4. Recommendations by the medical department or other health agency for the betterment of the health service.

In our eight year study of your sickness records, comparisons were made with the morbidity statistics among industrial employees maintained by the U. S. Public Health Service. This is the only information available on the extent of industrial illness. It is derived from periodic reports received from twenty-three industrial establishments in the northeastern part of the country.

It is well to state here that the maintenance of accurate and adequate sickness records should not be construed as a tool for weeding out and causing unemployment of workers,

but only as a diagnostic measure for detecting and correcting unhealthy working environments and placing workers in occupations commensurate with their physical capacities.

FINDINGS

Our findings relative to the maintenance and study of adequate sickness records are as follows:

1. That while fairly complete records on each lost time illness is available in Dr. DeMotte's office, no periodic analysis is made of these records.

2. That maintenance of sickness data is not well organized.

3. That the frequency of all illness since 1932 as revealed in Figure I, has been well below the rates for male industrial workers. However, employment for these years was generally low.

4. That the average number of days lost per year due to illness for the nine years (1929-1937 inclusive) was 5974. This, compared with an average yearly employment of 2191 over the same period, revealed 2.7 days lost per employee per year which compares very favorably with the average of 8.3 days per employee per year revealed by the American College of Surgeons for general industry.

5. That, with the exception of 1932, the number of cases of respiratory diseases (Figure III) per year is well below the rate for industry as revealed by the U. S. Public Health Service. This should be encouraging to the management as respiratory diseases of all types are being presented for compensation claims under some occupational disease acts. Probably no other type of disease is as prevalent in industrial medicine as those of a respiratory nature.

6. That the rates for rheumatism and hernia, shown in Figures IV and V, show that these types of illness are fairly well above the average for industry.

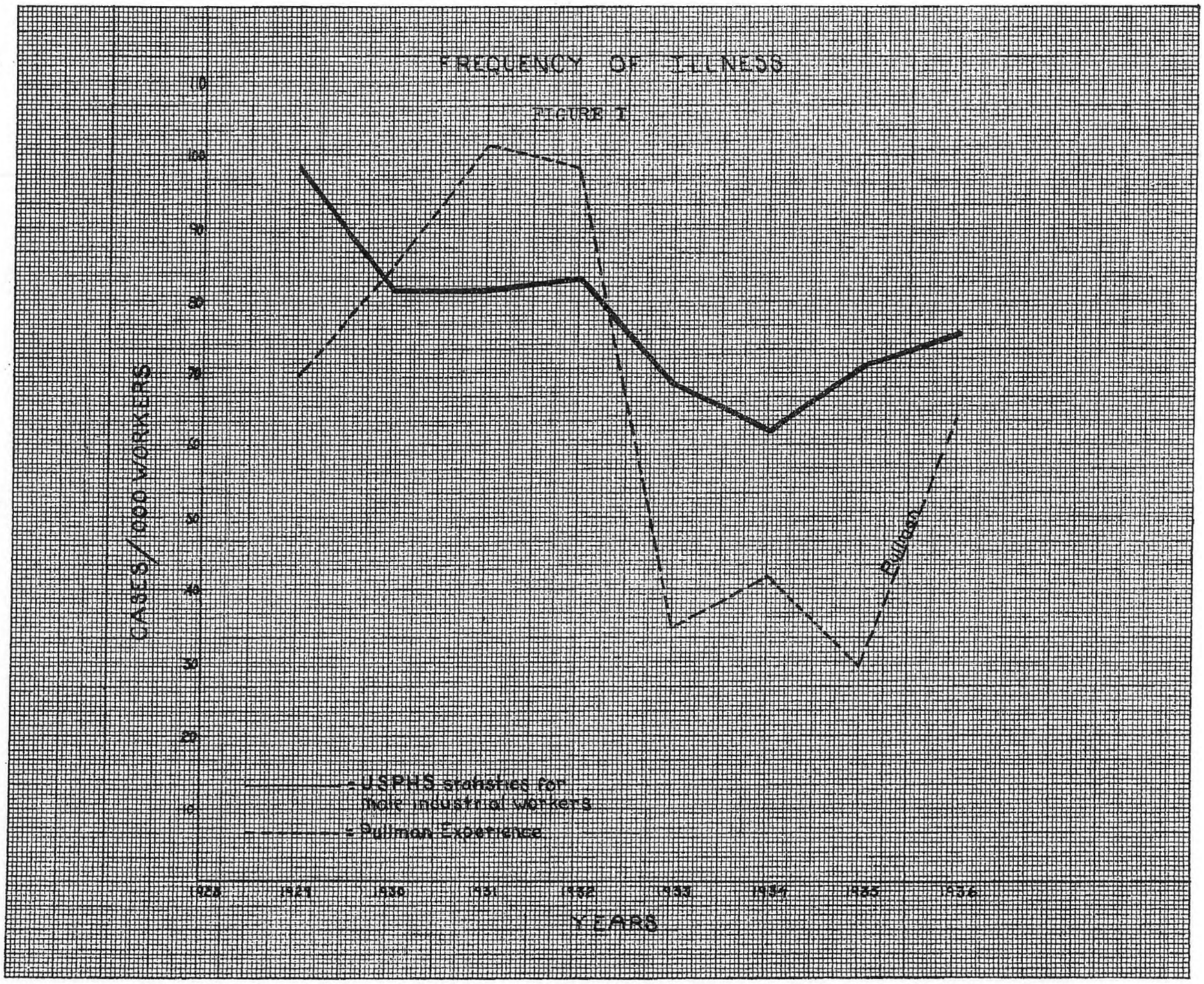
RECOMMENDATIONS

The recommendations pertaining to the maintenance and analyses of sickness records are as follows:

1. That a record system be instituted which will include all pertinent information necessary to

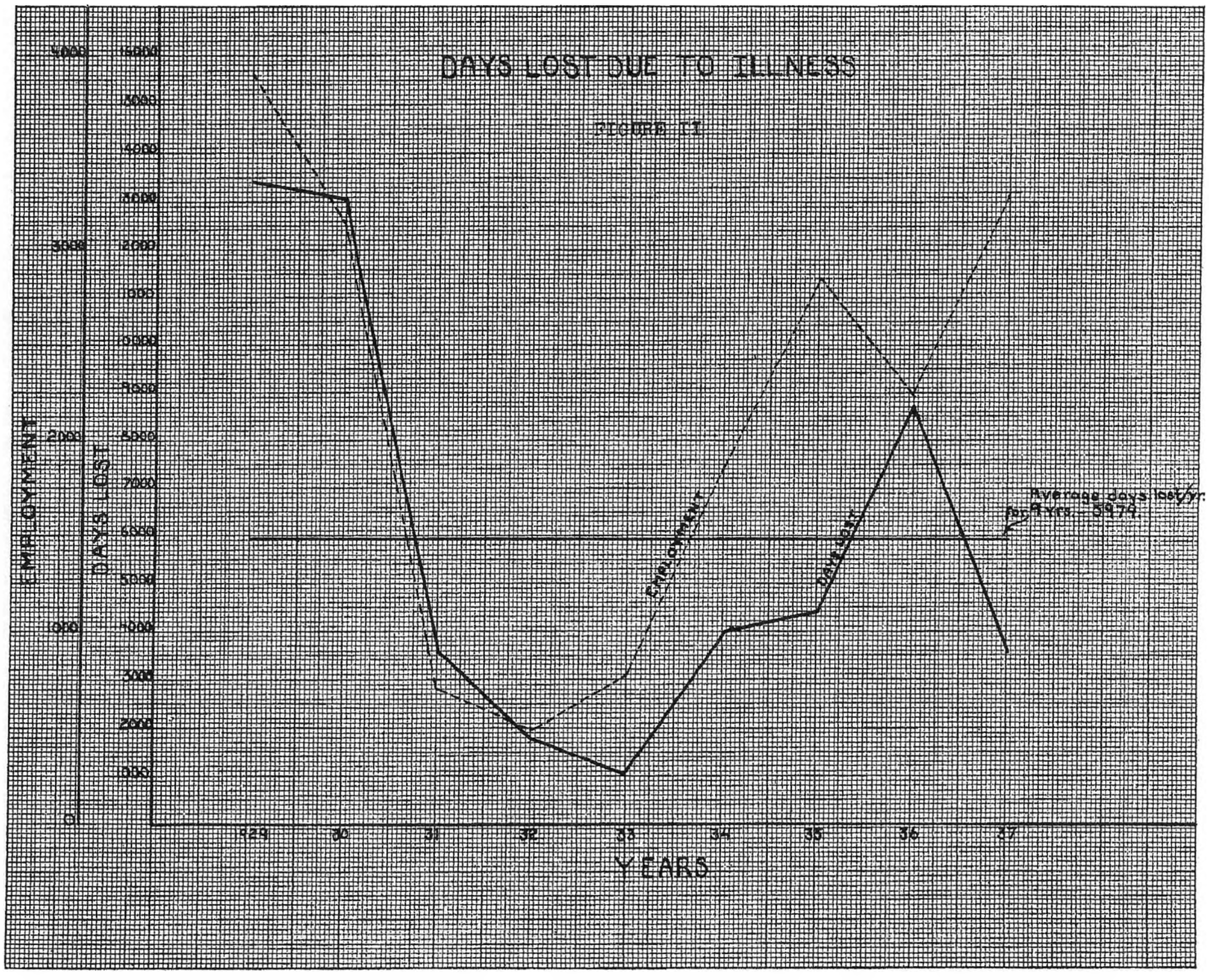
FREQUENCY OF ILLNESS

FIGURE I



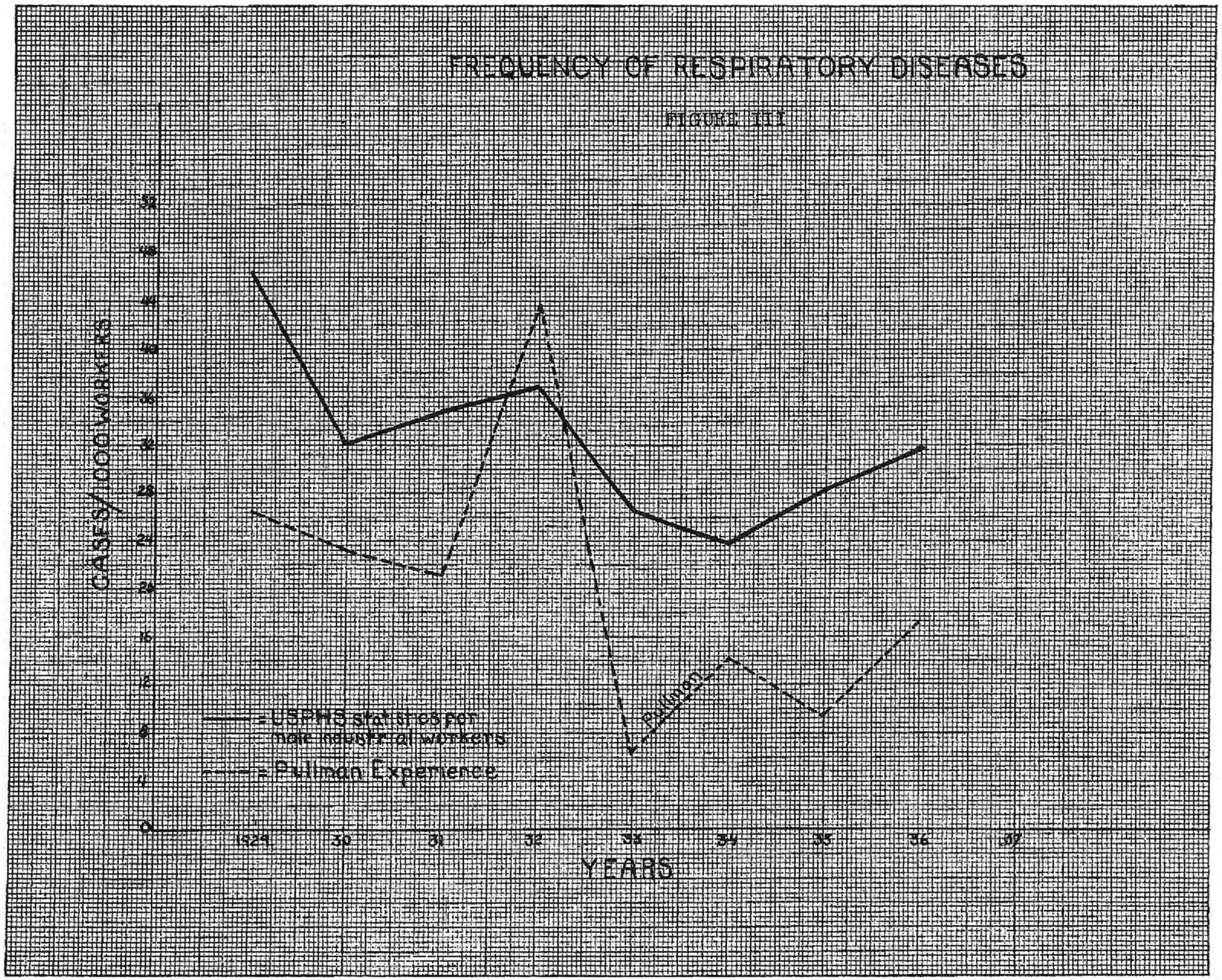
DAYS LOST DUE TO ILLNESS

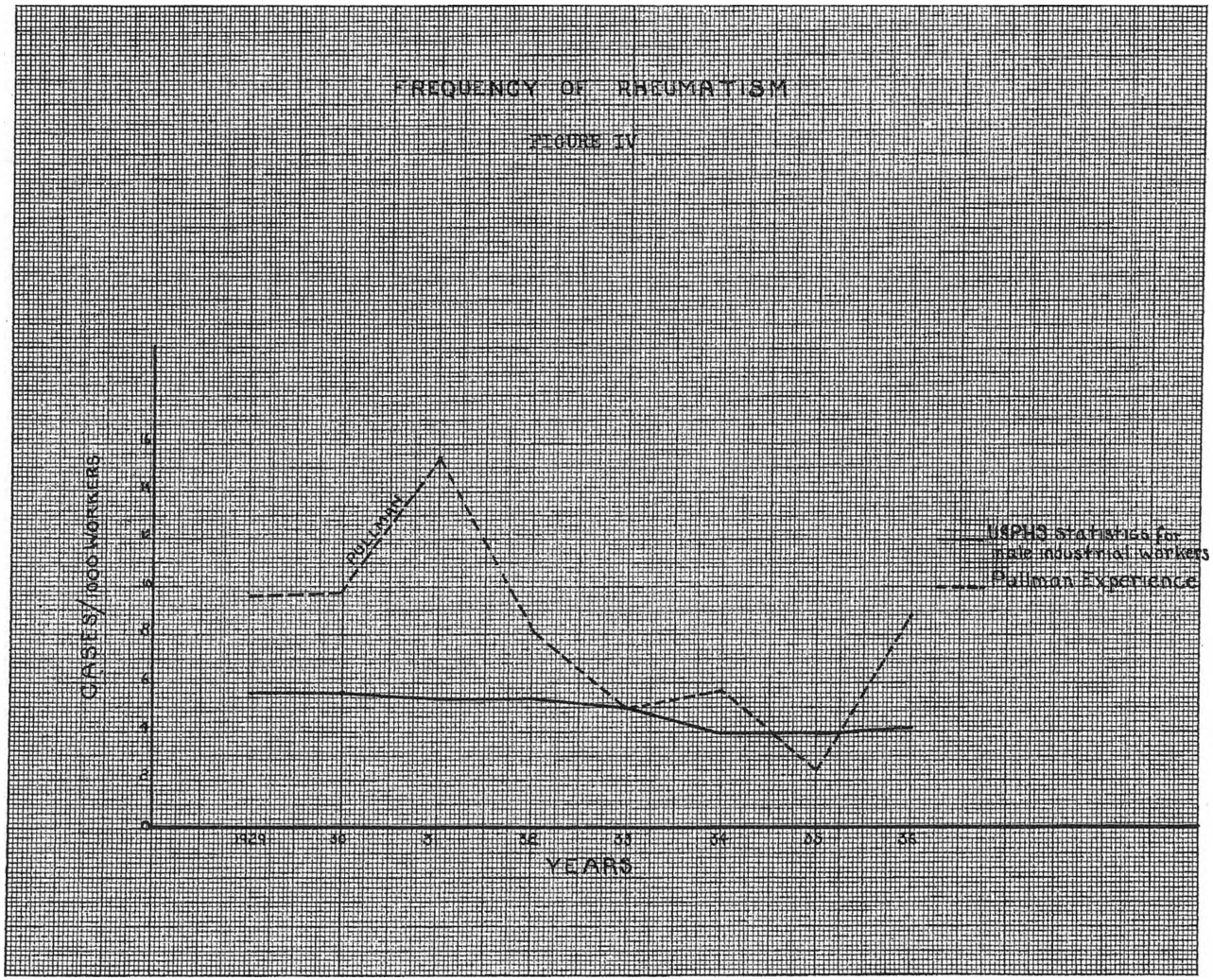
FIGURE 11

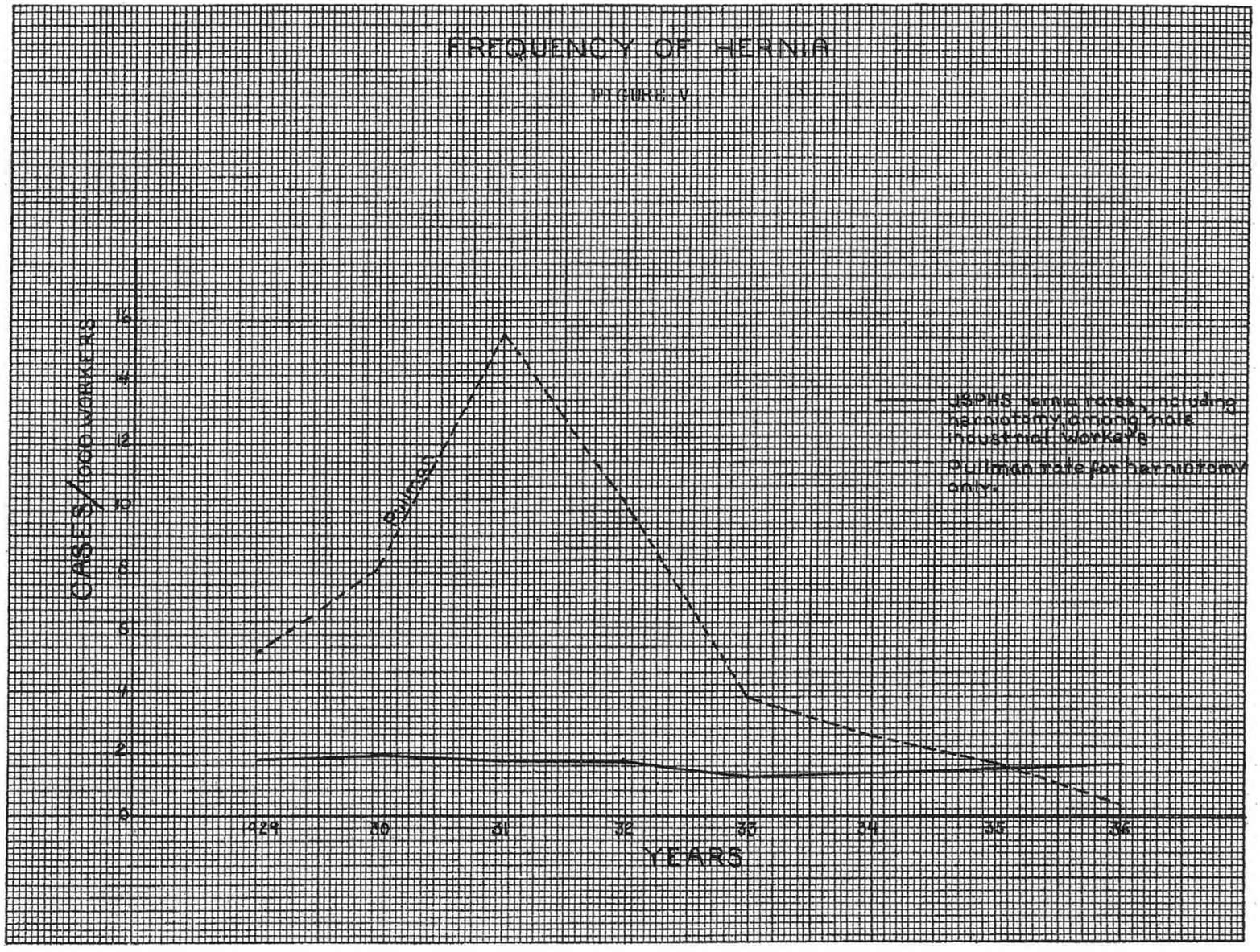


FREQUENCY OF RESPIRATORY DISEASES

FIGURE III




FREQUENCY OF RHEUMATISM
FIGURE IV
CASES/1000 WORKERS
0
1
2
3
4
5
6
PULLMAN
1929
30
31
32
33
34
35
36
YEARS
USPHS statistics for male industrial workers
Pullman Experience


FREQUENCY OF HERNIA
FIGURE IV
CASES PER 1000 WORKERS
16
14
12
10
8
6
4
2
0
QUINCY
USPHS hernia rates, including herniotomy among male industrial workers
Pullman rate for herniotomy only.
29
30
31
32
33
34
35
36
YEARS

determine the frequency of causes of illness for the plant as a whole and each department.

2. That, annually, an analysis should be made of the causes of ill health and that a report be submitted to the president containing an appraisal of the health status of the company together with cost data to properly set forth the problem and the need for continuing and enlarging the scope of the medical service.

DUST

The medical problems of dust inhalation has received so much attention that the necessity for a thorough health program has been overlooked. This has been due to the great amount of publicity given to this subject because of a sharp rise in compensation claims and newly enacted legislation. As a result, many managements have come to recognize dust as the chief cause of occupational diseases. However, it is important to associate dust as only one of the many atmospheric contaminants of industrial environments.

There appears to be no one satisfactory medical answer to the problem of dust harmfulness. True, some dusts are more harmful than others, however, all dusts are disagreeable and to what extent disagreeableness and harmfulness are related is a problem very much in need of further study. Some investigators state that the relation of acute respiratory infections to dusts, other than free silica, has never been proven. Yet, it is generally accepted that a greater incidence to respiratory infections can be shown statistically. This seems to prove the statement that a dust damaged lung is more susceptible to the more disabling forms of pulmonary disease, such as tuberculosis.

It may be said that inorganic dusts are far more injurious than organic dusts. The generally accepted opinion is that some inorganic dusts are able to penetrate deep into the lung tissues and are sufficiently soluble to be retained there and possibly set up a reaction. Some may become active in the body and cause definite and permanent injury; others may remain inert without apparent damage; and still others may be gradually absorbed. The two specific dusts causing the greatest pulmonary damage and disability, if inhaled in sufficient quantities over a sufficient period of time, are silica and asbestos. From the viewpoint of dust damage, it is generally accepted that the most dangerous dusts are those particles less than 10 microns ($\frac{1}{2500}$ inches). The error in most dust control programs has been in recognizing silica and asbestos and excluding other dusts, for excessive dustiness of any type may be harmful. The harmful effects are not necessarily confined to the lungs as some dusts are known to have an abnormal effect on the nose, throat and bronchial passages and indirectly on the heart and stomach. In other instances, workers have been found to be sensitive to some dusts, such as horse hair, feathers, fur and wool, and these result in allergic and asthmatic manifestations. Skin trouble among some workers exposed to dust may also be common. Thus we can appreciate the fact that the dust problem by no means revolves about silica and asbestos to the exclusion of the other dusts.

TABLE I

DUST DETERMINATIONS

Sample No.	Department	Location	Total No. of particles	No. of Silica particles	% of total under 2 microns
1	Steel Cabinet	Beside man intermittently operating duplex grinding wheel which had no exhaust system.	2,107,000	--	70
2	Steel Cabinet	Beside man intermittently using portable disc grinder. Only one operator working.	1,201,000	--	76
3	Bunk Room Building #5	Beside two men buffing aluminum. All buffing compounds used. No exhaust ventilation on wheels.	2,146,000	--	67
4	Bunk Room Building #5	Fifteen feet from #3 sample between two polishers using portable pneumatic cloth wheels. Men work beside open windows.	1,248,000	--	74
5	Bunk room Building #5	General Room air	869,000	--	71
6	Brass foundry	Beside machine molder. Only three are at work and about 25' apart	1,884,000	--	65
7	Brass foundry	Beside man shoveling sand onto vibrating screen	4,460,000	--	73
8	Brass foundry	In front of Mott Sandblast machine which was leaking	37,838,000	25,730,000	58
9	Brass foundry	General room air	8,430,000	--	70
10	Brass foundry	Beside bench molder along west wall. Another molder is 8' behind him and a laborer is dry sweeping close.	10,007,000	2,862,000	67
11	Brass foundry	Beside core maker working along an open window.	8,445,000	1,445,000	69
12	Brass foundry	Beside man knocking out brass castings into wheel barrow	34,653,000	19,059,000	57
13	Brass Dept. Sandblast room	In center of room containing a large steel shot blasting table and two sand blast barrels	965,000	--	76
14	" "	Beside steel grit blasting table	438,000	--	64
15	Building #5 3rd Floor	In front of sly sandblast cabinet	1,278,000	--	74
16	" "	Inside pressure helmet of sand blasters. A surge in the line blew out and the charcoal cartridge. 26,000,000 particles were carbon.	27,174,000	--	--
17	Brass Polishing	In center of polishing wheel area	2,122,000	--	72
18	" "	Beside man grinding bronze castings on carborundum wheel	2,356,000	--	64
19	" "	General room air after windows had been closed for 1½ hours	1,526,000	--	75
20	" "	Beside man polishing table legs	2,353,000	--	59

Management should be interested not so much with the technicalities of dust, but with what it is likely to be confronted, at present and in the future, in regard to compensation and other obligations as a result of industrial dust exposures. There is at present an "all inclusive" occupational disease act in Illinois. This makes it possible for any alleged pathological condition to be compensable if it can be associated with a dust exposure even though it can be shown to exist with other causes. Workmen's compensation administrators are making their interpretations more liberal. As a result, claims for pneumonia, asthma, bronchitis and even the common cold are presented. The fact that it is fairly certain that a dust damaged lung, whatever the cause, fares much worse if an acute infection supervenes upon it has opened up the entire field of respiratory diseases to occupational disease claims. Therefore, it would appear that from the economic viewpoint alone, it would be wise to disregard the technicalities of dusts and concentrate upon the reduction of all dusts irregardless of type.

DUST FINDINGS

Attempt was made to take air samples only about those dusty operations which were near normal production. As this was found to exclude too many dusty operations, it was deemed better to sample about any dusty job which was operating. Several dusty operations were at a standstill which, from visual inspection and knowledge of similar processes elsewhere, were known to be hazardous. Therefore, it is important to interpret the dust findings, revealed in Table I, correctly in light of the fact that no department was at normal operation. Most of the counts are low but this was due to the low operating schedule and the open windows and doors due to warm weather. Only further dust determinations during full operating periods and winter conditions will allow an accurate appraisal.

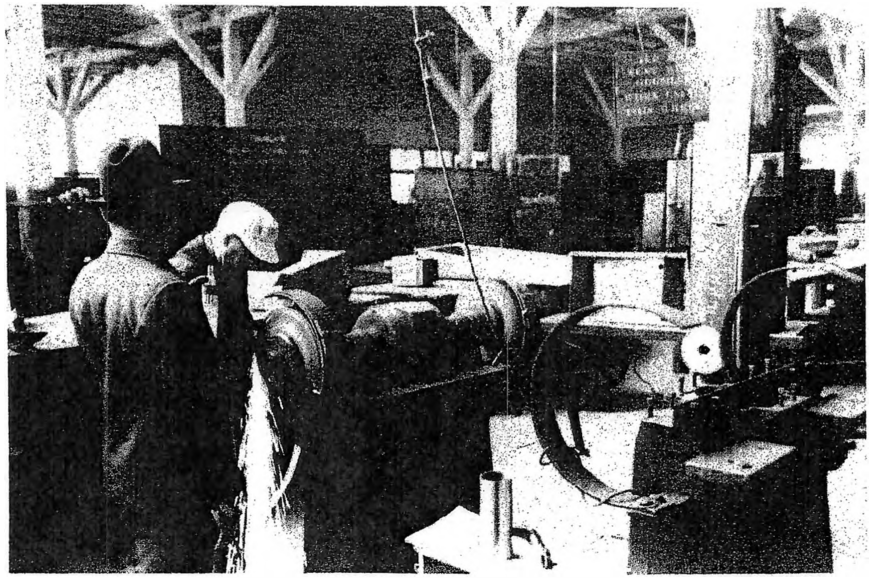
The specific dust findings are as follows:

Steel Cabinet Department:

1. We found duplex grinding wheels with no exhaust ventilation system. (Plate I). While a dust count taken beside an operator was low, the low working schedules were chiefly responsible. With these grinders in fairly constant use, normally a dust condition may develop which would support an occupational disease claim.

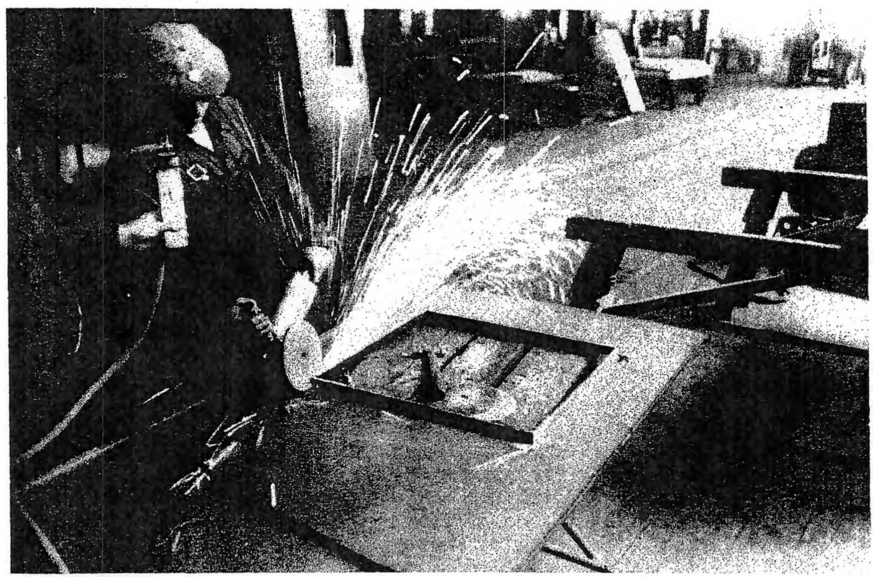
Recommendation: That stationery grinding wheels, in fairly constant use, be supplied with exhaust ventilation to remove the dusts. Industry, generally, has applied exhaust ventilation on grinding wheels as a health measure and we feel

PLATE I.



Duplex grinder with no exhaust hood to remove dust.

PLATE II.



Use of disc grinder with no respiratory protection for the worker to prevent his inhalation of excessive dust.

that the Pullman-Standard Company should likewise apply this principle.

2. We found men using portable disc grinders intermittently. (Plate II). At the time of our visit only one respirator was in use although several men were operating disc grinders. With several of these grinders operating, it may be possible for a heavy dust concentration to develop, particularly in the winter months.

Recommendation: That approved filter respirators be supplied to men using disc grinders for over two hours daily. If continuous use of these machines is made, the work should be located along a wall so that lateral exhaust ventilation may be designed for the bench on which the work is performed.

Bunk Room:

1. We found stationary polishing wheels with no exhaust hoods for the removal of dust (Plate III). Heavy accumulations of dust could be seen on walls and boards and heavy dust clouds emanated from the operations, particularly when dressing the wheel.

Recommendation: That exhaust hoods be designed for these wheels to effectively remove the dust. This would eliminate the need for the respirators which are not a positive control measure.

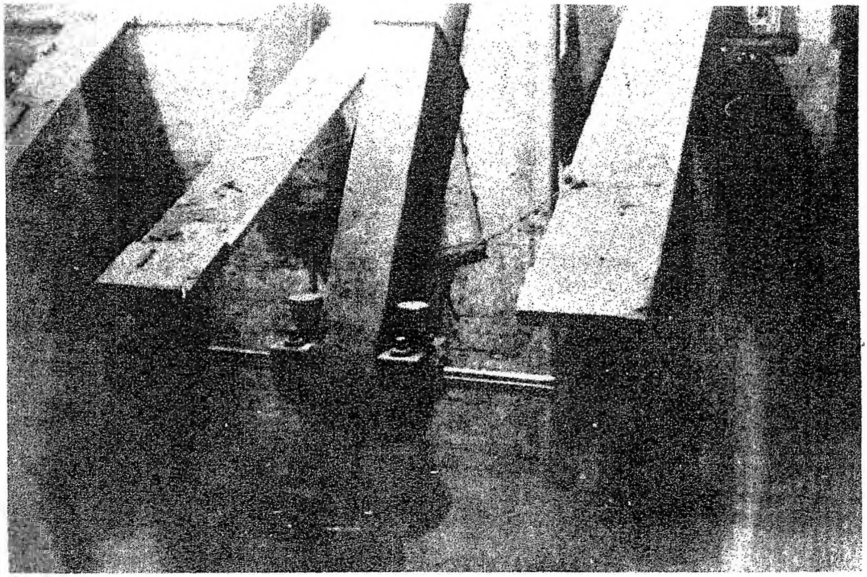
2. We found the portable polishing wheels liberating a good deal of dust (Plate IV). Although respirators are supplied to the operators, they are not always worn, probably due to the fact that no real maintenance of these respirators is provided.

Recommendation: That the portable wheel polishing be isolated in a separate room which can be done by partitioning off a section of the present room or the adjoining wrapping room. Clean and approved respirators should be supplied to the operators daily and the room should be designed for general exhaust ventilation of at least 20 air changes per hour.

Brass Foundry:

1. With the foundry running at such low capacity, it was felt that air samples would be of uncertain value in establishing the true extent of the dust problem. However, air samples were taken and even under so low an operating schedule, hazards were found of sufficient magnitude to assume that the entire foundry would present an abnormal dust condition when operating near normal capacity.

PLATE III.



Crudely installed polishing wheels with no exhaust ventilation. Note poor housekeeping and accumulation of dust on boards.

PLATE IV.

Use of portable pneumatic polishing wheel; a chief source of dust in bunk room.

The hazardous operations under present production were as follows:

a. knocking out castings
b. dry sweeping floor
c. cutting sand on open vibrating screen
d. sandblasting in Mott sandblaster due to defective door

2. We found that no adequate dust control program exists in the foundry. If any dust control program is to be effective, it must be designed to eliminate and control dust at its source not after it gets into the general atmosphere and pollutes the workroom. The present roof exhaust fans remove dust only after it has passed the breathing zone of the workers. The respirators were not being worn and all were dirty.

General Recommendation: In connection with our study of the foundry, we visited the Universal Castings Corporation in the Clearing District. This company is supplying you with brass castings. The purpose of our visit was to view their molding operation which is conducted without the use of sand by substituting gypsum. As a result of this study; its operating costs and absence of silica, we recommend the following:

1. That a foundry of this type be installed for brass castings. Our reasons for this recommendation are as follows:

   a. It will entirely eliminate a silica dust problem.
   b. Production of the foundry will be increased.
   c. Labor cost reduced.
   d. Subsequent grinding operations eliminated.
   e. Allow production of brass castings at a much lower cost than your present foundry is able to furnish.

2. The Mott sandblasting machine be eliminated and wet tumbling barrels be substituted.

Brass Department Sandblast Room:

1. We found that the steel shot machine appears to have eliminated any dust problem and that the two sandblast barrels appear well designed and effective.

Recommendation: That if repeated air samples reveal counts about as low as our findings of 965,000 particles, the air line mask may be removed from the operator. This step should be undertaken by first substituting a light approved filter respirator for

the air line mask in order to satisfy the worker that no drastic steps are being taken without consideration of his health.

Building #5 - 3rd Floor:

1. We found a sand line of the Sly Cabinet where sand fell onto an open screen.

Recommendations: A housing be placed around the screen and open end of the sand pipe.

2. We found that during our air sampling within the positive pressure mask, the sandblaster was able to open his air valve sufficiently to blow out the charcoal cartridge. Aside from the carbon dust forced into his mouth, serious internal injury may result from the sudden increase in pressure.

Recommendation: That the air valve be set against manipulation to an excess pressure by the sandblaster.

Brass Polishing Room:

1. We found that this room, although free from a possible silica dust hazard, was obviously too dusty. Poor design of the wheel exhaust system and the lack of maintenance were the chief causes of excessive dustiness. This dust is important to control because of the generally high incidence of respiratory diseases among buffers and polishers.

Recommendations: That the exhaust hoods on the wheels be redesigned to more efficiently collect the dust, and that exhaust fans and supply fans be supplied capable of producing a minimum of 25 air changes per hour in this room. The dust particles, as they are liberated from the wheel, disperse into the air or fall to the floor because the hoods do not sufficiently enclose the wheel. Specific recommendations as enumerated in our section on Exhaust Ventilation, should be followed.

Mattress Room:

1. Air samples for bacterial contamination were taken about the hair picking machine and the operation in which horsehair was manually spread on a table. These samples revealed pollution too numerous to differentiate as to type, particularly the sample about the picking machine. The potentiality of respiratory infections in such type of work should make control measures necessary.

Recommendations: Our recommendations for controlling this condition are:

a. That a room be built about the picking machine and that a mechanical exhaust hood be placed over the feeding table of the machine.

b. That wall exhaust fans be placed in the above recommended room, capable of producing a minimum of 25 air changes per hour.

c. That a light filter respirator be worn by the operators.

Forge Shop:

1. We found a corner of the forge shop in which equalizers were being worked on with portable grinding wheels. Men were not working at the time, but from the number of wheels and the fact that no measures were in force to prevent excessive dust inhalation, it was apparent that a hazardous condition may develop.

Recommendations: Our recommendations for the control of this condition consists of -

a. Partitioning of this area from the rest of the shop and installing supply and exhaust ventilation capable of at least 30 air changes per hour or segregating this operation in some other location.

b. That approved and clean respirators be supplied daily to the operators.

LEAD

The hazard associated with the use of lead compounds was one of the first recognized health hazards in this country. Yet today, lead poisoning is still one of the chief causes of occupational disease. While we have fairly well reduced the acute lead poisoning cases, the problem of chronic poisoning, from small daily dosages, has become of increasing industrial importance. One of the chief reasons for this situation is that emphasis has been placed on a curative program rather than a preventive program and that the engineering control information has not been as widely spread and applied as the medical phase of the problem. Even after years of medical study on lead poisoning and the dissemination of the results, it is generally found that medical supervision of lead workers is distressingly inadequate and that the need for such supervision is not generally appreciated.

The chief source of lead poisoning is through the inhalation of lead dust and fumes. However, lead poisoning by ingestion and absorption of lead compounds are important enough to be carefully considered in any preventive program.

No single sign or symptom may be considered diagnostic of lead poisoning. Many conditions may influence the reaction of the tissues to lead, so that personal and physical factors may affect its response. It is obvious to those acquainted with this problem in industry that efforts to reduce the incidence of industrial lead poisoning will be greatly handicapped if emphasis is not placed on such observations as may be considered presumptive evidence of lead absorption and lead intoxication. Lead poisoning is always preceded by a stage of lead absorption, but lead absorption is not always followed by lead poisoning. The worker may still be on the job and free from symptoms during the stage of absorption so that much success in prevention can be secured by detecting these individuals.

Symptoms from lead poisoning may present themselves long after the exposure has terminated. The basophilic aggregation test should be helpful in this type of prevention in those exposed to lead. The intoxicating effects of lead characterized by its many toxic episodes may be so slow in developing that, any method, which will reveal the incipient stages of this industrial intoxicant is, therefore, highly desirable. The industrial hygienist and physician can render a more efficient and commendable service to industry if those exposed to lead can be picked out before the more dangerous and obvious manifestations overtake the worker.

It is realized that much of the confusion existing in the ranks of the medical profession regarding the diagnosis of industrial lead poisoning, its degree and the amount of disability, was due to a lack of uniformity in the terminology used to express opinions. We wish to emphasize the necessity of obtaining complete occupational and medical histories

July 12, 1963

Dr. Robert E. Slayton,
310 S. Michigan Avenue,
Chicago 4, Illinois.

Dear Doctor Slayton:

I have your excellent summary of 7/10 on your patient Joseph Allen.

Allen is not an employe of The Pullman Company, but I understand was employed at Pullman-Standard Shops at 111th Street, (Pullman Inc.)

I am forwarding your report on Allen to Doctor T. C. Fial, who serves as Medical Examiner at Pullman-Standard and who will undoubtedly see Allen for examination and placement if and when he reports for return to work there.

With kindest regards,

Sincerely yours,

R. M. GRAHAM, M.D.

RMG:fg

cc - Dr. T. C. Fial
Pullman-Standard,
720 E. 111th Street,
Chicago, Illinois.

[illegible] for placement?
I trust you had a nice vacation.

July 12, 1963

lO on your patient

nan Company, but I
at 111th Street,

h to Doctor T. C.
ndard and who
cement if and when

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M.D.

Pullman-Standard,
720 E. 111th Street,
Chicago, Illinois.