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F/L 95 (see F/L 96) 7/11/89 memo → 8/10/89 memoF/L 96 "Medical Legal Trends in Occupational Disease" Comp 16"Industry as a Source of Disease" Comp to back

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Medicolegal Trends in Occupational Diseases

—A Statistical and Legal Analysis of Medicolegal Experience—

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Medicolegal Trends in Occupational Diseases

—A Statistical and Legal Analysis of Medicolegal Experience—

CONTEST is as old as Greek mythology.

In a land successively beset with midget golf courses, jigsaw puzzles, "knock-knock" conundrums and the "handies" furore, it is not unexpected that the diverse factors which may affect the medicolegal trends in occupational diseases should assume all the permutations and combinations possible on a Chinese lottery ticket.*

Any analysis of the medicolegal trends of occupational diseases involves a consideration of all of the aspects of occupational disease problems, including the measurement and evaluation of industrial exposures; interpretation and application of information relating to physical examinations, diagnoses, clinical laboratory work and x-ray findings; the correlation of the industrial and medical information in terms of cause-and-effect relationships; occupational disease legislation; case decisions of damage suits, commission hearings, and review decisions; and insurance coverage.

No attempt has been made in this paper to be exhaustive; the problem of analysis is complicated enough in the attempt to present the proper material and reach some sound conclusions. One finds that he is limited to a great extent by the lack of the availability of information as well as the heterogeneity of the material which is available.

It is desirable in this discussion to consider definitions and terminology; experiences with occupational disease claims and reporting; an analysis of existing compensation laws; typical court decisions; complaints and allegations; the activities of bureaus of industrial hygiene; examples of pending legislation; and the suggestions of the American Bar Association.

Definitions and Terminology

IT IS NOT feasible or possible to attempt to set down in this paper an exhaustive group of definitions or to comment on all the misuses of terms in regard to occupational disease problems. However, it is well to indicate that these are phases which are important and to call attention particu-

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larly to certain definitions which are commonly used; also to describe a few instances of misuse of terms.

Taken partly from the recommendations of the American Standards Association¹ and also from certain state codes² the following definitions are suggested for these important words:

DUSTS—solid particles produced by fragmentation; ordinarily do not flocculate nor diffuse, but settle by gravity.

FUMES—solid particles produced by condensation or volatilization, often with chemical reaction; flocculation or coalescence may occur.

VAPORS—gaseous forms of substances normally solid or liquid; vapors diffuse.

GASES—formless fluids which diffuse easily and occupy the space of enclosures.

Anyone who indulges in the mental gymnastics of creating definitions realizes how difficult it is to make an adequate definition for the expression "occupational disease." Most such definitions take into consideration the occupation or the environmental factors without attempting to make limited comments on the effects of such industrial environment. I have previously defined occupational disease elsewhere³ as follows:

"An occupational disease is one which occurs with definite frequency and regularity in occupations where there is a specific exposure as the cause which operates to produce effects in the human body recognized clinically by the medical profession as pathological changes and effects produced by the specific exposure involved."

As has been indicated, the terminology of occupational disease has been very much abused from time to time. The laws and people generally speak of "compensation for occupational disease." It is the intent of the laws to compensate for *disability* resulting from occupational disease; the employer should not be required to pay compensation for a diagnosis. It is suggested, therefore, that the expression "*occupational disease disability compensation*" be generally used because it is explicit.

The terms "exposure" and "hazard" are frequently used interchangeably by many persons—these terms are not the same.⁴ Although a hazard involves an exposure, the latter is not a hazard un-

* Prepared for the Midwest Conference on Occupational Diseases, Detroit, Michigan, May 3-7, 1937.

til so proved by adequate methods of measurement and rating.

Disease Claims and Reporting Experiences

PROBABLY the best material of its kind regarding occupational disease claim experience has recently come out of the State of New York, as published in the "Industrial Bulletin," January, 1937.⁵ The original data have been rearranged on the basis of frequency and in certain instances where expedient, percentage figures have been added.

Table I.
DISEASE CLAIMS CLOSED
METROPOLITAN NEW YORK — 1936.

	Number	%	Awards	%	Denied	%
ALL CASES:	1036	(100.0)	407	39.3	629	60.7
Dermatitis	684	(66.0)	299	22.9	385	77.1
Poisons	76	(7.3)	42	55.2	34	44.8
Synovitis	30	(2.9)	19	63.3	11	36.7
Lead poisoning	41	(3.9)	25	61.0	16	39.0
Tuberculosis, pulmonary	19	(1.8)	2	10.5	17	89.5
Carbon monoxide	16	(1.5)	6	37.5	10	62.5
Silicosis	3	(0.3)	0	0.0	3	100.0

TABLE I shows the disease claims closed for Metropolitan New York during the period of 1936. Note that there was a total of 1036 cases, of which 407, or 39.3%, received awards and 629, or 60.7%, were denied. Dermatitis was the chief cause of claim, there being 684 cases, or 66% of the total—of which 299, or 22.9%, received awards and 385, or 77.1%, were denied. Poisons were the next most frequent cause of claim and constituted 7.3% of the total number of cases. Of the general classifications, synovitis was fourth with 30, or 2.9%, of the total number of cases. Referring now to the more specific causes of claim, we find the following in order of greatest frequency; lead poisoning; tuberculosis, pulmonary; carbon monoxide; and silicosis. Observe that the majority of the pulmonary tuberculosis and carbon monoxide claims were denied—that although there were only three claims for silicosis, a number much too small for any sound conclusion, these were all denied.

Table II.
DERMATITIS CLAIMS CLOSED
METROPOLITAN NEW YORK — 1936.
(By Industry or Trade)

	Number	%	Awards	%	Denied	%
ALL CASES	684	(100.0)	299	22.9	385	77.1
Restaurant	105	(15.3)	54	51.4	51	48.6
Service	60	(8.8)	22	36.6	38	63.4
Fur	52	(7.6)	33	63.5	19	36.5
Garment	50	(7.3)	18	36.0	32	64.0
Food	41	(6.0)	16	39.1	25	60.9
Manufacturing	40	(5.8)	22	55.1	18	44.9
Printing	36	(5.3)	18	50.0	18	50.0
Cosmetics	35	(5.1)	16	45.7	19	54.3
Construction	31	(4.5)	21	67.7	10	32.3
Mercantile	26	(3.8)	8	30.7	18	69.3
Cleaners	21	(3.1)	14	66.7	7	33.3
Machinery	19	(2.8)	2	10.5	17	89.5
Paint	15	(2.2)	6	40.0	9	60.0
Automobile	12	(1.7)	2	16.7	10	83.3

Because dermatitis greatly outnumbered all causes of claims, TABLE II shows the dermatitis claims closed in Metropolitan New York during 1936, by industry or trade, showing the total num-

ber, awards and denials by percentage. Observe that of the 684 dermatitis claims closed during 1936, 299, or 22.9%, received awards and 385, or 77.1%, were denied. The original data disclosed the fact that the chief causes of dermatitis claims were soap and water, and that dyes of various kinds occupied the next place in point of frequency. The percentage distribution of the claims, therefore, by industry or trade as noted in TABLE II results on the whole from exposure to these substances.

Table III.
DURATION OF DISABILITY
OCCUPATIONAL SKIN DISEASE
NEW YORK CITY
(390 cases) (1928)

	Percent
2 weeks to 1 month	38
3 to 6 months	16
1 to 3 months	21
More than 6 months	24

Ordinarily it is not assumed that dermatitis cases or cases of occupational skin disease create any extended disability. The available information on this subject is not very recent, but in TABLE III is shown the duration of disability of occupational skin diseases for New York City about 1928, involving 390 cases.⁶ It will be seen that there is more of an even spread than one would expect, only 38% of the cases involving disability lasting from two weeks to one month.

Table IV.
DISEASE CLAIMS CLOSED
REASONS FOR DENIAL
METROPOLITAN NEW YORK — 1936.

	Number	%	Dermatitis		Other Claims	
			Number	%	Number	%
ALL CASES	629	(100.0)	385	61.2	244	38.8
No lost time	195	(30.9)	170	44.2	25	10.2
No medical evidence	122	(19.4)	54	14.0	68	30.7
Not covered by law	99	(16.0)	43	11.2	56	22.9
Failure to prove	67	(1.0)	49	12.7	18	7.4
Not occupational disease	51	(0.8)	6	0.3	45	18.4
Not over 7 days disability	50	(0.8)	32	8.3	18	7.4
Non-appearance	23	(0.3)	22	5.7	1	.....
No casual relation	11	(0.2)	6	0.2	5	0.2
Unspecified	5	.....	2	.....	3	.....
No lost earnings	2	.....	.....	.....	2	.....
Notice over limit	1	.....	1	.....	.....	.....
Case withdrawn	1	.....	.....	.....	1	.....
Without prejudice	1	.....	.....	.....	1	.....
Federal—no jurisdiction	1	.....	.....	.....	1	.....

TABLE IV shows reasons for denial of claim—separating the figures for dermatitis and for other claims. Note that there were three chief causes of denial of claim in the following order: "no lost time" (30.9%); "no medical evidence" (19.4%); and "not covered by law" (16.0%). The original data included the expression "casual" which is here reproduced, because the same typographical error has been made twice in other states. The word "casual" is intended here.

A classification of disease awards according to provisions of the compensation law schedule is

shown in TABLE V. Again, dermatitis leads (although somewhat masked by inclusion under other headings), while anilin and "any and all occupational diseases" follow in order. Attention is called

Table V.
DISEASE AWARDS
ACCORDING TO COMPENSATION LAW SCHEDULE
METROPOLITAN NEW YORK — 1936.

Paragraph of Schedule	Number	Percent
ALL CASES	407	100.0
2. Lead and sequelae.....	27	6.6
4. Mercury and sequelae.....	1	0.2
6. Arsenic and sequelae.....	3	0.7
8. Benzol	9	2.2
Anilin, others, sequelae.....	65	15.9
9. Carbon bisulphide and sequelae.....		
Sulphides	2	0.5
12. Dope poisoning	1	0.2
Carbon tetrachloride	3	0.7
13. Formaldehyde	3	0.2
14. Chrome ulceration, sequelae.....	1	0.2
Chromic acid	9	2.2
Bichromates	2	0.5
22. Carbon monoxide	6	1.5
23. Acids, sulphuric	3	0.7
hydrochloric	4	1.0
hydrofluoric	1	0.2
24. Petroleum products (gastro-intestinal)	1	0.2
25. Blisters	7	1.7
Abrasions	6	1.5
26. Bursitis	7	1.7
Synovitis	19	4.7
27. Dermatitis, acids	18	4.4
Alkalies	112	27.5
Oils	43	10.6
28. Any and all occupational diseases	54	13.2

(No awards for (1) Anthrax; (3) Zinc; (5) Phosphorus; (7) Wood alcohol; (10) Nitrous fumes; (11) Nickel carbonyl; (15) Skin cancer; (16) Glanders; (17) Compressed air; (18) Miners' diseases; (19) Cataract in glass workers; (20) Radium; (21) Methyl chloride; during 1936).

to the fact that there were no awards for the various diseases or substances as shown in the note at the bottom of the table.

Turning now to the State of Ohio,⁷ there are available data for compensable occupational diseases reported during the nine-year period 1928-1936 inclusive, as exhibited in TABLE VI. Of the total of 11,172 cases of compensable occupational diseases, dermatitis again took first place with

Table VI.
SUMMARY OF COMPENSABLE OCCUPATIONAL DISEASES
REPORTED DURING 1928 - 1936 INCLUSIVE
STATE OF OHIO

	Number	Percent
ALL CASES	11,172	100.0
Dermatitis	7,760	69.4
Tenosynovitis	1,287	11.6
Lead poisoning	1,269	11.3
Chrome ulceration (nasal and skin).....	322	2.9
Prepatellar bursitis	186	1.7
Compressed air illness.....	170	1.5
Benzol and derivatives.....	63	0.6
Volatile petroleum products poisoning..	51	0.5
Brass or zinc poisoning.....	49	0.4
Carbon bisulphide poisoning.....	30	0.3
Sulphur dioxide poisoning	23	0.2
Potassium cyanide poisoning	17	0.1
Arsenic poisoning	15	0.1
Wood alcohol poisoning	3	.....
Carbon dioxide	3	.....
Phosphorus	1	.....

(No cases of Anthrax, Glanders, Mercury poisoning, Manganese dioxide poisoning or Radium poisoning reported 1928-1936, inclusive.)

7,760 (69.4%); tenosynovitis, 1,297 (11.6%); and lead poisoning was third with 1,269 cases (11.3%). It seems significant that no compensable cases were reported during this period due to anthrax, glanders, mercury poisoning, manganese dioxide poisoning or radium poisoning. It must be pointed out, however, that this is significant only for the State of Ohio, and that we may not conclude that it is of real significance for other states.

Table VII.
PROPORTIONATE INCIDENCE OF O. D. (COMPENSATED) BY
CASES DURING 1920 - 1929 INCLUSIVE
STATE OF WISCONSIN

	Number	Percent
ALL CASES	3,019	100.0
Toxic fluids	840	27.8
Irritant dusts and fibers.....	396	13.1
Toxic vapors, gases and fumes.....	353	11.7
Miscellaneous irritants	320	10.6

A different picture is revealed by the experience of the State of Wisconsin⁸ during the 10-year period, 1920-29 inclusive, in TABLE VII showing the proportionate incidence of occupational diseases (compensated) by causes. Of the 3,019 cases during this 10-year period, the data are here limited to those occurring as causes to the extent of 10% or more; upon this basis, "toxic fluids" accounted for 27.8%; "irritant dusts and fibers" 13.1%; "toxic vapors, gases and fumes," 11.7%; and "miscellaneous irritants" 10.6%.

Interesting always to industrial executives and economists, and of necessity of importance to the industrial physician and surgeon, is the cost of occupational disease disability compensation. Such figures are relatively rare. TABLE VIII shows the

Table VIII.
COMPENSATION PAID
ON O. D. DURING 1920-1929 INCLUSIVE
STATE OF WISCONSIN

	Cost	Percent
ALL CASES	\$575,052	100.0
Toxic vapors and gases.....	146,063	25.4
Irritant dusts and fibers.....	117,885	20.5
"Germs"	64,980	11.3

compensation paid on occupational diseases during the 10-year period, 1920-1929 inclusive. Of the total cost of \$575,052, "toxic vapors and gases" accounted for 25.4%; "irritant dusts and fibers" 20.5%; and "germs" 11.3%. Here again we have limited the statistical display to those causes ac-

Table IX.
AVERAGE INDEMNITY PAID
ON O. D. DURING 1920-1929 INCLUSIVE
STATE OF WISCONSIN

	Average Per Case
ALL CASES	\$191
Toxic Vapors and fumes.....	414
"Germs"	322
Irritant dusts and fibers.....	298
Toxic fluids	52
Miscellaneous irritants	47

counting for 10 or more percent of the total amount paid out. Based upon the same experience, the average indemnity paid per case is also of interest. TABLE IX shows that the average indemnity per case for all cases was \$191.00—that "toxic vapors

and fumes" (\$414.00), "germs" (\$322.00)—and "irritant dusts and fibers" (\$298.00) were above the average; "toxic fluids" (\$52.00) and "miscellaneous irritants" (\$47.00) were considerably below the average.

Returning to the important problem of skin diseases in industry, the experience of Massachusetts⁹ for the 11-year period 1925-1935 inclusive, as exhibited in TABLE X confirms experiences

Table X. SUMMARY OF REPORTED COMPENSABLE CASES OCCUPATIONAL SKIN DISEASES MASSACHUSETTS, 1925 - 1935, INCLUSIVE		
All Cases of Occupational Diseases.....	3,215	
Total Skin Cases.....	1,973 (or 61.3%)	
	Number	Percent
All cases of skin disease.....	1,973	100.0
Dermatitis.....	1,792	90.5
Chrome ulceration.....	93	4.9
Anthrax.....	78	4.0
Potassium cyanide poisoning.....	10	0.6

in other states and gives some additional information.

Observe that of all the cases of occupational diseases reported during the 11-year period (3,215) those due to occupational skin diseases numbered 1,973, comprising 61.3% of the total number of reported cases. The connotation dermatitis was responsible for 90.5%, or 1,792 cases; chrome ulceration, anthrax and potassium cyanide poisoning figured but a small percentage in the total group, but were present in sufficient numbers to be registered.

In Connecticut¹⁰ it has been possible within recent years to show the relationship between the cases of occupational diseases as reported by physicians and those cases which have been compensated but not reported by physicians. The significant differences occurring under these two types of classification are shown in TABLE XI where it is

Table XI. RELATION OF CASES REPORTED TO CASES COMPENSATED OCCUPATIONAL DISEASES STATE OF CONNECTICUT — JULY, 1935 - JUNE, 1936		
	Reported by Physician	Compensated— Not Reported
ALL CASES.....	142	265
Dermatitis (alkalies).....	10	8
Dermatitis (cutting oils).....	17	23
Asbestosis.....	2	3
Silicosis.....	10	11
Arthritis, frostbite (exposure).....	1	12
Lead poisoning.....	3	11
Mercury poisoning (including dermatitis).....	10	43
Dermatitis (plating solution).....	9	2
Dermatitis (poisonous plants).....	4	21
Dermatitis (solvents).....	8	7

noted for instance that all cases reported by the physicians amounted to 142, whereas those cases which were compensated but not reported by physicians numbered 265. These figures clearly show what happens when the reporting system is not coordinated with compensation activities, which be it said to the credit of Connecticut is in the process of being remedied by appropriate legislation.

Analysis of Existing Compensation Laws

IN MAKING an analysis of existing occupational disease disability compensation laws, it is to be kept in mind that the situation is continually changing; one is also reminded that the interpretation of the legal requirements is also subject to changing opinions and judgment. It is believed, however, that the material here presents the general consensus, which in itself may not be as clear as one would like in some instances.

It is natural to assume that we are first interested in knowing what states have declared disability through occupational diseases, compensable. Because of a court decision in the State of Maryland defining the term occupational disease, Maryland is interpreted as being in a class by itself. Assuming this, occupational disease disability is compensable in 18 states and the District of Columbia,¹¹ as follows: California, Connecticut, Illinois, Indiana, Kentucky, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, New York, North Carolina, North Dakota, Ohio, Rhode Island, Washington, West Virginia and Wisconsin. In five states—Minnesota, Nebraska, New Jersey, Ohio and Rhode Island—silicosis is not included among occupational diseases. (Bill re silicosis now pending in Ohio). In West Virginia, silicosis is the only occupational disease compensable.

Our next point of interest lies in determining the type or method of coverage of these laws. There are three usual methods of covering occupational diseases in these acts:¹² (1) by naming the specific occupational diseases for which disability is compensable (the so-called "schedule" system); (2) by the inclusion of all occupational diseases by blanket provisions (the so-called "blanket" coverage); and (3) by using the word "injury" instead of the word "accident" in the law and including occupational disease as injuries. The following states as designated fall under these three types of coverage:

"SCHEDULE"—Kentucky, Minnesota, Nebraska, New Jersey, North Carolina, Ohio, Rhode Island, West Virginia and Washington.

"BLANKET"—Connecticut, Illinois, Massachusetts, Missouri, New York and Indiana.

"INJURIES"—California, District of Columbia, North Dakota and Wisconsin.

Especially difficult to interpret (and somewhat doubtful as to existence in certain instances) are the provisions or interpretation of provisions regarding common law rights of recovery in the various states. Common law right of recovery seems well settled in 12 states: California, Kansas, Kentucky, Louisiana, Minnesota, Mississippi, Missouri, Nebraska, New Hampshire, New Jersey, New York and West Virginia. However, occupational disease is compensable, to some extent, in all of this group except four states: Kansas, Louisiana, Mississippi, and New Hampshire. Hence, common law right to recovery is very much limited in eight of the 12 states.

No court decisions on common law right of recovery exist in 17 states and District of Columbia: Alabama, Arkansas, Arizona, Colorado, Florida, Idaho, Indiana, Montana, Nevada, New Mexico, North Carolina, South Carolina, South Dakota, Utah, Vermont, Wisconsin and Wyoming. Occupa-

tional disease is compensable in the District of Columbia, and in North Carolina and Wisconsin.

Courts have held no common law right of recovery in three states: Illinois, Michigan and Ohio. North Dakota falls into this group probably, not because the common law right never existed there but because, if it ever existed, it has been completely superseded by the Workmen's Compensation Act. In that respect the law of North Dakota is rather unique.

In three states: Connecticut, Georgia and Texas, common law right of recovery is extremely doubtful.

The common law right to recover for occupational disease caused by the negligence of the employer probably exists, although there is some doubt, in Delaware, Iowa, Maine, Maryland, Massachusetts, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Virginia and Washington.¹¹

Increasing interest has been manifested in provisions for medical boards and regarding physical examinations. Five states: Kentucky, Massachusetts, New York, North Carolina and West Virginia have what may be called "medical boards." New Jersey, Rhode Island and Ohio provide for better than ordinary type of physical examination, but do not have provisions for medical boards.¹¹

Court Decisions:

COURT decisions form a very valuable background of opinion regarding important points of controversy and also demonstrate the legal trends.

One must not forget that these court opinions involve consideration of medical evidence and therefore, they are really medicolegal opinions. Sometimes the decisions are rendered on appeals from lower courts and sometimes on appealed commission cases sent up for review.

With the exception of the first two cases abstracted, the decisions given here were rendered during 1936.¹³ The selection of these abstracts for this paper was based upon three points: (1) medicolegal principles involved; (2) type of disease alleged; and (2) geographical distribution. It was thought that by such a selection one might be able to get a cross-sectional view of the decisions during 1936.

Because there has been a greater opportunity to review cases of silicosis, probably because a greater number of these have been appealed, it will be found that this type of alleged disease occurs with greatest frequency in these decisions. The cases have been arranged chronologically, based upon the date of the decisions.

OCCUPATIONAL DISEASE DEFINED (Maryland).—In this case the Court defined an occupational disease as follows: "An occupation or industry disease is one which arises from causes incident to the profession or labor of the party's occupation or calling." It has its origin in the inherent nature or mode of work of the profession or industry, and is the usual result or concomitant. If, therefore, the disease is not a customary or natural result of the profession or industry *per se*, but is the consequence of some external condition or independent agency, the disease or injury can not be imputed to the occupation or industry, and is in no accurate sense an occupation or industry disease." *Victory Sparkler & Spec. Co. v. Francks*, (147 Md. 368, 128 A, 635).

SILICOSIS—RIGHT OF ACTION—OCCUPATIONAL DISEASE NOT COVERED BY ACT. (New York).—The Appellate Division certified the question, "Does the complaint state facts sufficient to constitute a cause for action?" Complaint alleged that plaintiff through defendant's failure to comply with statutes, contracted an occupational disease for which compensation was not payable under the Act. Defendant's motion to dismiss the complaint was denied.

Court held that this was an occupational disease, the natural and unavoidable result of the employment, but not an "accidental personal injury" as limited by the statute. The Court cannot disregard the express limitation. There is still a field in which the statute fails to impose liability on the employer, to provide compensation for injury or death, regardless of fault; and in which an injured person may seek damages by legal action where there has been fault. Whether the legislature should provide a more effective and comprehensive remedy in such cases, or whether the employer should in such cases be relieved of liability even in case of fault, is a matter which concerns the legislature and not the courts. Order of court below denying dismissal of complaint, affirmed, and certified question answered in the affirmative.—*Barrencotto v. Cocker Saw Co., Inc.* N. Y. Ct. of Appeals. Decided December 31, 1934.

SILICOSIS — SAFE PLACE TO WORK — FAILURE TO PROVE SILICOSIS RESULTED DURING PERIOD COMPLAINED OF. (New Jersey).—Plaintiff sued for injuries resulting in silicosis. Decedent died from cancer. Respirators were provided, but not during the one-year period of which plaintiff complained.

It was for the jury to determine whether decedent inhaled dust during the period mentioned—whether respirators should have been furnished—and question of adequacy of the ventilating system.

Proof was lacking that the dust contained any silica, that it was 10 microns or less in size, that it existed in such concentrated amounts, and that decedent was exposed for a sufficient length of time to cause silicosis.

The rule has not been adopted, that an industry carried on in a lawful manner, though its operation produces dust in small or large quantities, is *per se* negligent. To hold that the existence of dust is *prima facie* evidence of negligence would violate the rights of operators and also the presumption against negligence. Motion for nonsuit granted.—*Cichocki, Executrix v. Geigy Co. Inc.* (183 Atl. 463). N. J. Hudson County Circuit Ct. Decided January 6, 1936.

SILICOSIS — COMPENSATION DENIED — NO WAGE LOSS PRIOR TO TERMINATION OF EMPLOYMENT. — (Wisconsin) — Until there is actual wage loss caused by occupational disease, there can exist no compensable disability under the Workmen's Compensation Act. Applicant did not become disabled because of his silicosis until after termination of his employment. Judgment reversed—court below instructed to set aside award of Commission and dismiss application. *Chain Belt Co. et al. v. Ind. Com. et al.* (264 N. W. 502). Wisconsin Supreme Ct. Decided January 7, 1936.

LEAD POISONING — QUESTION OF OCCUPATIONAL DISEASE OR ILLNESS FROM SUDDEN INJURY DUE TO FUMES. (Tennessee).—Trial court sustained de-

murrer of defendant because occupational disease shown was not compensable under the statute—petition dismissed and petitioner appealed.

Facts presented tended to indicate a sudden and unforeseen result unlike the gradual development of lead poisoning. How this is, proof will have to show. Reversed; case remanded for a hearing on the merits.—*Johnson v. Globe Union Mfg. Co.* Tennessee Supreme Ct. Decided January 25, 1936.

EMPLOYERS' LIABILITY POLICIES—WHETHER RADIUM POISONING COVERED. (New Jersey).—Appeal from judgment for defendants. Question was whether contracts of insurance covered loss for which action was brought. Finding was adverse to the plaintiff.

Conceded that radium poisoning is an occupational disease and not compensable at the time these policies were in force. The facts furnish no more basis for saying that the effect of the occupational disease was spread evenly over the whole period of employment, than for saying employee was affected only during the first week or year of employment or the last week or year thereof. Judgment of no cause of action.—*U. S. Radium Corp. v. Globe Indemnity Co. et al.* (2 N.E. (2d) 640) N. J. Ct. of Errors and Appeals. Decided January 31, 1936.

MANGANESE POISONING—FAILURE TO WARN EMPLOYEE OR ELIMINATE DUST. (New Jersey).—Plaintiff alleged illness due to inhaling manganese dust, claiming manganese poisoning. Jury awarded plaintiff \$25,000. Defendant appealed.

Ample proof of manganese dust in employment. Plaintiff changed from a robust individual to a helpless and permanent invalid in five years. Shown that defendant was neglectful in not warning plaintiff, in not making reasonable provision to protect plaintiff and by failure to eliminate dust as far as reasonably practicable. A fact question which only the jury could determine was thus presented. Judgment affirmed.—*Davis v. New Jersey Zinc Co.* (182 Atl. 850). N. J. Ct. of Errors and Appeals. Decided January 31, 1936.

SILICOSIS — DATE OF DISABILITY — WAGE LOSS. (Wisconsin). — Disability as used in the 1933 amendment must be defined as an injury which causes wage loss. The question is, what is meant by "wage loss?" Considering that claimant is incapable of more than slight physical exertion, that by reason of his physical incapacity due to silicosis he can be employed only in occupations which involve so-called light work, there is evidence which sustains the finding of the Commission that he has sustained a wage loss, which measured by the rate of compensation he had theretofore received, amounts to 50%. Judgment affirmed.—*Schaefer & Co. et al. v. Ind. Com. et al.* (265 N. W. 390). Wisconsin Supreme Ct. Decided February 4, 1936.

DEATH CAUSED BY PNEUMONIA — EVIDENCE OF LEAD POISONING AND LYMPHATIC LEUKEMIA (Illinois).—Immediate cause of death was pneumonia. Plaintiff claimed decedent contracted lead poisoning, which, with another disease, predisposed him to pneumonia. Defendant claimed decedent did not have lead poisoning—that predisposing cause was lymphatic leukemia, a fatal disease — that

plaintiff failed to establish which of these two caused death.

Testimony showed that decedent suffered from both disorders—that each of them tended to lower his resistance to disease. The cause of death was a scientific question. Testimony of witnesses for both parties was sufficient to justify the Commission's finding that lead poisoning was the predisposing cause of death.—*Lewin Metals Corp. v. Ind. Com et al.* (1 N. E. 217). Illinois Supreme Ct. Decided February 14, 1936.

PNEUMOCONIOSIS — INHALATION OF DUST — VIOLATION OF LABOR LAW — STATUTES OF LIMITATIONS (New York).—Plaintiff alleged inhalation of dust and contraction of pneumoconiosis—that the employer was thereby negligent. Plaintiff's employment ceased more than three years before action was commenced.

Injury to plaintiff was complete when alleged negligence of defendant caused plaintiff to inhale deleterious dust. For that injury, including all resulting damages the defendant was then liable.

The statute provides in unambiguous language that the period of limitation begins to run at the moment when right to begin an action accrues. This court concurred in the opinion that the causes of action were all subject to the three-year period of limitation.

Regarding the charge that the defendant failed to provide the safeguards required by the Labor Law, the court ruled that liability for disregard of statutory duty was really "created" by statute. Judgments modified in accordance with this opinion and as so modified, affirmed.—*Schmidt v. Merchants Despatch Transp. Co.* (200 N. E. 824). N. Y. Ct. of Appeals. Decided March 3, 1936.

SILICOSIS AS RESULT OF EMPLOYER'S NEGLIGENCE — RIGHT TO COMMON LAW ACTION — NO RECOVERY UNDER ACT. (Georgia). — Workmen's Compensation Act cannot be applied except in case of injury "by accident." The remedy provided by this statute is exclusive within the field of its operation, but does exclude redress in cases to which it is not applicable.

If the act does not apply to an "occupational disease" caused by injuries which were "not the result of an accident and were not compensable under the provisions" of the act, the employee may maintain an ordinary or common-law action for damages against his employer, provided a cause of action exists in his favor under the law relating to the liability of a master, independently of the Workmen's Compensation Act. The right "to bring an ordinary action for damages" is not excluded by this statute as to injuries which do not fall within its terms.—*Covington v. Berkeley Granite Corp.* (184 S. E. 871). Georgia Supreme Ct. Decided March 24, 1936.

SILICOSIS — WHEN RIGHT TO COMPENSATION ACCRUES — NO WAGE DEDUCTION FOR TIME LOST. — (Wisconsin).—Commission appealed judgment vacating an award, holding that insurer was liable, being on risk at time of first lost time period, (ascribed by Commission to silicosis) although disease was not discovered until six months later.

Because employer made a gift to employee of wages legally lost did not obviate effects of such loss as far as compensation for permanent dis-

ability through silicosis is concerned. Recovery cannot be had for amount of wages paid by employer for lost time, but recovery herein was limited to compensation for the permanent disability found. Reversed with directions to enter judgment confirming award.—*General Acc. Fire & Life Assur. Corp. v. Ind. Com. et al.* (266 N. W. 226). Wisconsin Supreme Ct. Decided March 31, 1936.

INHALATION OF CHLORINE — CLAIM DENIED — NO APPEAL — COMMON LAW REMEDY. (Michigan).—Plaintiff appealed from a dismissed declaration, alleging permanent injuries from inhalation of chlorine, lack of warning and provision of protective devices. Defendant's answer showed that both parties were under the Workmen's Compensation Act—that compensation was denied plaintiff because he had not suffered from an accident arising out of and in course of employment. Plaintiff denied that departmental proceedings constituted an election of remedies.

Plaintiff's remedy was to seek an appeal to the full board and then review by certiorari if necessary, as the act provides. Plaintiff released all claims or demands at law when he submitted question of injury to arbitration. Such exclusive jurisdiction arose not by consent of the parties, but by provision of the statutory enactments. Plaintiff's declaration definitely localized the alleged injury as to time and place, hardly fitting the definition of an occupational disease. Order affirmed.—*Two v. Munising Paper Co.* (266 N. W. 311). Michigan Supreme Ct. Decided April 6, 1936.

BENZOL POISONING — WHETHER ONE NO LONGER AN EMPLOYEE ENTITLED TO RECOVERY. (New York).—Employee contracted benzol poisoning in employment September, 1931, became disabled in June, 1932, but meanwhile had ceased to be an employee in November, 1931, becoming a partner in a company where he performed the same kind of work. He died in January, 1933. On dates of disablement and death he was not employed, but was a member of a partnership. The Industrial Board made an award against the employer and insurance carrier. The Appellate Division reversed the award and dismissed the claim.

The Court adopted the principle that a person who has been employed in an occupation in which he was subject to contraction of a disease described in the statute and who, while so employed has contracted the disease but does not become disabled until a time when he is no longer an employee, is entitled to recover compensation from the employer who last employed that person in the employment to the nature of which the disease was due. This interpretation applies to the time of contracting disease as an employee, rather than the time of disablement. Order of Appellate Division reversed and award of Industrial Board reinstated.—*Matter of Comm's of Taxation & Finance et al. v. Nu-Art Advt. Co.* (2 N. E. (2d) 280). N. Y. Ct. of Appeals. Decided May 19, 1936.

PULMONARY ASBESTOSIS — NO DUST REMOVAL SYSTEM — WHETHER ACCIDENT. (North Carolina).—Claimant denied compensation by Commission because he "did not sustain an injury by accident." Had been employed for six or seven years and at discharge on October 25, 1934 was suffering from pulmonary asbestosis. Prior to December 19, 1933,

defendant had failed to install dust removal system, such as those in similar general use. Claimant appealed to Superior Court which ruled that plaintiff had sustained an injury arising out of and in course of employment, as the direct and proximate result of employer's negligence.

Award of Commission, denying compensation, should have been affirmed. The Commission found that plaintiff was not injured by the negligence of the defendant, but that his injury was caused by a disease which he contracted while working in defendant's plant as its employee. All of the evidence showed that plaintiff's injury was the result of an occupational disease, and for that reason was not compensable under the Act. Judgment reversed and remanded.—*Swink v. Carolina Asbestos Co. et al.* (186 S. E. 258). North Carolina Supreme Ct. Decided June 15, 1936.

TUBERCULOSIS — WHETHER DISEASE OCCUPATIONAL TO THE FLOUR MILLING INDUSTRY. (Minnesota).—Plaintiff sought damages for pulmonary tuberculosis alleged to have been contracted while in defendant's employ, basis of claim being violation by defendant of statutory requirements respecting heating and ventilating places of employment. Plaintiff recovered a verdict of \$18,000, which the trial court set aside, holding cause of condition was wholly within the field of speculation and conjecture.

The trial court said: "There was much flour dust in the room where the plaintiff did her work. It was not always heated or ventilated to her satisfaction. The experts all classified flour dust as one of the 'harmless dusts.' The available lists of this locality show that the incidence of tuberculosis is less among flour mill workers than in the general public. There is no record of any other workers in the place contracting the disease. The evidence fails utterly to indicate that tuberculosis is a disease occupational to the flour milling industry. It may be possible that conditions existing in the place where she worked did cause a development of the disease with which she was afflicted. But what shall we say of her sister, who worked beside her, and twice as long, who slept with her, and yet who did not contract the disease? What shall we say of the other workers, her companions, who worked in the same environment some of them many times as long as she did, and who did not contract the disease?" Upon plaintiff rested the duty of furnishing proof "affirmative of the issue." The cause of her condition was left "in the realm of conjecture," and, as such, her cause fails. Judgment affirmed.—*O'Connor v. Pillsbury Flour Mills Co.* (267 N. W. 507). Minnesota Supreme Ct. Decided June 19, 1936.

TUBERCULOSIS — WHETHER DISEASE OCCUPATIONAL TO THE DRESS MANUFACTURING BUSINESS. (Connecticut).—The Commission awarded compensation to claimant suffering disability due to tuberculosis contracted in the course of employment; factory room was badly crowded, hours of employment were long, conditions were very unsanitary, and claimant had been exposed to disease because of the fact that other employees were suffering from it. Defendants appealed to court below, which found that ordinary tuberculosis from which plaintiff was suffering was a non-occupational disease, not peculiar to the occupation in which plaintiff was engaged. Both the doctor called by plaintiff

and the one called by the defendants so testified. The trial court sustained defendants' appeal and remanded the case to the Commission with direction to dismiss the claim. From that judgment plaintiff has appealed.

In 1927 the Workmen's Compensation Act was amended to define a personal injury as including only an "accidental injury which may be definitely located as to the time when and the place where the accident occurred, and occupational disease as herein defined." An occupational disease was defined as "a disease peculiar to the occupation in which the employee was engaged and due to causes in excess of the ordinary hazards of employment as such."

Held that to award compensation to plaintiff in this case would be to go against the legislative intent embodied in the amendment of 1927. There was no error.—*Madeo v. I. Dibner and Bros. Inc. et al.* (186 Atl. 616). Connecticut Supreme Ct. of Errors. Decided July 30, 1936.

BRONCHITIS — INHALING ORGANIC DUST — NO REASON TO ANTICIPATE HARMFUL RESULTS. (Mississippi).—Plaintiff employed 1921 to 1931 in mixing oats, corn, alfalfa, meal and molasses. After quitting he developed chronic bronchitis, for which he sued four and a half years after leaving employment, claiming ailment was caused by breathing dust generated in place of employment. It was agreed among the expert witnesses that the breathing of mineral dust is harmful and may cause respiratory diseases—the controversy is as to whether the breathing of organic dust is harmful.

Granting that the medical testimony on behalf of plaintiff is true, that organic dust is capable of producing chronic bronchitis—in other words, that defendant failed to furnish plaintiff a reasonably safe place to work, this alone did not make out a case of liability. Plaintiff was required to go further and show that the unsafe place was the result of defendant's failure to exercise reasonable care. There was no evidence whatever tending to show that defendant should have reasonably anticipated the harmful effects of the dust. Defendant had the right to stand on the history of the business, which showed the dust generated by such plants to be harmless. It was not required to consult medical experts about a matter unquestioned in the business. There being no evidence that defendant should have reasonably anticipated the harmful effects of the dust, there was no case for the jury. Defendant was entitled to its requested directed verdict. Judgment for plaintiff reversed and judgment here for the defendant.—*Meridian Grain & Elevator Co. v. Jones.* (169 So. 771). Mississippi Supreme Ct. Decided October 5, 1936.

SILICOSIS — SUFFICIENCY OF THE DECLARATION. (West Virginia).—This writ of error involves the sufficiency of the declaration in a silicosis case, the demurrer to the declaration having been sustained by the court below. Defendant contends that the declaration shows no causal connection between plaintiff's alleged silicosis and his employment, and no failure of defendant's duty, but does show that plaintiff failed to use ordinary care and that his alleged action is barred by the statute of limitations.

Scott v. Rinehart & Dennis Co. (116 W. Va. 319, 180 S. E. 276)—a silicosis case relied on by defendants—is clearly different from this case. There the

action was not brought until nearly two years after cessation of employment; here plaintiff's action was brought in the fall of 1934 and within a year from the alleged contraction of the disease.

It was held that defendant's strictures on the declaration are not well taken and that demurrer should have been overruled. Where an employee without fault himself, contracts an occupational disease because of negligence of his employer, the latter must respond in damages. Judgment reversed.—*Blatt v. United Zinc Smelting Corp. et al.* West Virginia Supreme Ct. of Appeals. Decided October 6, 1936.

RASH FROM PEELING FRUIT — OCCUPATIONAL DISEASE — NOT COMPENSABLE (Oregon).—Plaintiff appealed from a judgment for defendant, State Industrial Commission, in an action started by plaintiff to receive compensation for an injury sustained during employment. Defendant's order denying plaintiff compensation was sustained by the Circuit Court.

Employment was seasonable and extended over a period annually of six to seven months from 1929 to 1934. During the years 1930-1934 inclusive, plaintiff suffered from a rash as did other employees. The evidence indicates that a residue of the arsenic spray used on the fruit remained upon many of the apples and pears which plaintiff peeled. Plaintiff does not contend that her hands were cut or bruised, and does not contend that anything untoward occurred in the performance of her duties, except that somehow a poisonous substance entered her system.

Held that condition for which plaintiff sought compensation was an occupational disease. The ailment for which compensation is sought must be traumatic as distinguished from idiopathic. Commission did not err when it denied compensation to plaintiff. If workmen suffering from occupational diseases in this state are to have relief, the authority must come from the legislature and not from this court. Judgment affirmed.—*Ryan v. State Ind. Acc. Com.* (61 P. (2d) 426). Oregon Supreme Ct. Decided October 23, 1936.

SILICOSIS — THIRD STAGE WHEN DISCOVERED — DEFENDANT'S NEGLIGENCE AS CAUSE — INSUFFICIENT EVIDENCE (Missouri).—First action resulted in a verdict for \$27,000 against the defendant, upon which the defendant appealed. Plaintiff was exposed to dust created by operations and the petition alleged several grounds of negligence, especially failure to provide protective devices and to provide examinations, as well as notice of danger—all of which were charged as violations of statutes.

The question is whether injury resulted from dust inhaled by plaintiff while an employee of defendant, although evidence amply sustains charge that defendant failed to perform some, and possibly all of the statutory obligations, which constitutes negligence *per se*. Evidence shows that plaintiff worked from 1921 to 1929 for defendant, quitting during the latter year because he felt that his health was being impaired. The disease was said to be in its "third stage" at the time of the first examination in October, 1932. There was no support for a finding by the jury that the plaintiff's employment by defendant in 1929 caused him to contract silicosis. The evidence sufficiently establishes the fact that the employment by defendant from 1921 to 1925 was of sufficient duration to

have caused the injury, but there is no evidence upon which a conclusion can be based that the disease of silicosis could be contracted and then remain dormant and unnoticed from 1925 until some time in 1929. The plaintiff, to recover, must make a complete case pointing to defendant's negligence as the cause of the injury. Defendant's demurrer to the evidence should have been sustained. Judgment reversed.—*Bieser, Admstrx. v. Goran*, (100 S. W. (2d) 897). Missouri Supreme Ct. Decided November 12, 1936.

SILICOSIS — STATUTE OF LIMITATIONS — WHEN STATUTE BEGINS TO RUN (Pennsylvania).—Defendant appeals from the orders of the Court of Common Pleas granting a new trial. Plaintiff alleged that he suffered an occupational disease resulting from defendant's violation of the statute regulating employment in industrial establishments, contending that defendant did not supply a reasonably safe place to work measured by the statutory requirement. Defense maintained that action is barred by the statute of limitation, which was two years. In the opinion granting the new trial, the trial judge stated that the finding "that plaintiff last worked within the two-year period is against the weight of the evidence on that issue. Since the verdict is necessarily premised upon that finding, the verdict cannot stand and the entire case must be retried." Plaintiff contended that for occupational disease, the time should not begin to run until plaintiff knew or should have known that he had the disease either during the period of employment or at any time after the employment ended.

The court held that the limitation period begins when the breach of duty to provide a reasonably safe working place occurs. The master's failure to perform his duty is regarded as a single wrong continuing so long as the employment continues, and such wrong must be redressed by action brought within two years and not thereafter from the time when the employment terminates. It is immaterial that the first symptoms of the disease were misunderstood to indicate pleurisy; it now appears that as a result of the work the man was suffering from incipient silicosis and even though it began prior to the termination of employment and matured afterward, he is entitled to recover all the resulting damages of which he can offer proof down to the time of the trial as in other cases. Judgment affirmed.—*Plazak v. Allegheny Steel Co.* Pennsylvania Supreme Ct. Western Dist. Decided November 23, 1936.

SILICOSIS — GRINDER AT TILE PLANT — CONSTRUCTION OF SAFETY STATUTES — REQUISITES TO RECOVERY (Missouri).—Plaintiff obtained a verdict for \$11,041.66, claiming contraction of silicosis because of defendant's alleged failure to comply with statutory requirements. Defendant appealed. Plaintiff was permitted to file a second amended petition which changed the allegation of working during 1931-32-33 to 1928-29-30. Defendant claimed that this added a new cause of action.

Court held that both the original and amended petitions adhere to the injury originally declared upon and it was proper for the court to allow this amendment. The fact issues upon which the plaintiff had the burden of proof, and which plaintiff's instructions authorizing a verdict should have required the jury to find in plaintiff's favor were, as

follows: (1) Is silica dust a noxious poisonous or disease-producing dust? (2) Is there a disease of silicosis, which is peculiar to or the natural result of exposure to continuous breathing of silica dust? (3) Was silica present in the dust produced by defendant's grinders in such form and quantity as to produce the disease of silicosis? (4) Could exposure to the dust produced by defendant's grinders during the time when and in the manner which plaintiff was working about them or any of them produce the disease of silicosis? (5) Did the hood and suction fan of the new Bridgeport grinder effectively prevent the production of dust in such form and quantity as would produce the disease of silicosis? (6) Did the plaintiff have the disease of silicosis? (7) Did plaintiff contract the disease of silicosis from being caused to breathe dust produced by reason of defendant's failure to comply with any of the statutory provisions? Since the standard here fixed by statute is no more definite than the common law standard, it required construction in order to determine what standard it meant to set up for employers.

Defendant's contention that the certificates of approval of condition in its plant after inspection by the Commissioner of Labor constituted a defense is without merit. The duty to comply with both the specific requirements and general standards of these statutes is an absolute and mandatory duty directly placed upon the employer by the legislature which does not depend upon any approval or disapproval of the Commissioner of Labor. Judgment reversed and the cause remanded.—*Smith, Executrix v. Harbison-Walker Refractories Co.* (100 S. W. (2d) 909). Missouri Supreme Ct. Decided December 14, 1936.

Complaints and Allegations

IT IS thought valuable to consider briefly the kinds of complaints which are registered in commission cases. As a rule, the complaint is filled in on a printed form opposite a heading which calls for the kind of disease claimed. It is believed that the following list of complaints taken from a series of recently filed cases shows to some extent the character of the wording used and the types of disease claimed: Disability due to occupational disease; pulmonary tuberculosis; steel dust in lungs from grinding; lung abscess; lung disease caused by inhalation of dust and sand; occupational disease due to asbestos; dust collected in lungs; chronic bronchitis; asbestos dust affected lungs; pains in chest—pneumonia, fatal; pulmonary; flat feet; chronic laryngitis; stomach and back affected by dust and fumes; pulmonary occupational disease from poisonous substances; lead poisoning; cement poisoning; silicosis; tetraethyl poisoning; lungs; pneumonitis; lead poisoning from removing paint and repainting surfaces; mechanic in a factory; pulmonary disease, fatal; working under fumes of burning oil, caused by heating metal; tuberculosis; tuberculosis in a grinder and chipper; dust collected in lungs; tuberculosis and silicosis.

In court damage suits, there is considerable similarity in the allegations. Usually the cause of action is based upon the negligence of the employer to provide a reasonably safe working place—to protect employees from effects of breathing injurious dusts, fumes, fibers, vapors, gases and other deleterious substances, knowing that such were dangerous and excessive—to comply with

certain statutory regulations regarding such protection—and to warn employees of such dangers. It is alleged that because of such negligence on the part of the employer, the employee became sick, sore and disabled (the disease may or may not be named specifically)—incapable of working at his trade—obliged to pay out certain moneys for medical advice and treatment—removed from the scene as breadwinner at head of his family—death resulted because of illness sustained—survivors obliged to pay out certain moneys for funeral and burial expenses. Wherefore, the plaintiff prays for certain designated damages to be paid by the defendant. There are certain variations in these allegations, but the above recital covers, generally speaking, the pattern used.

Bureaus of Industrial Hygiene

IN CONNECTION with the medicolegal trends of occupational diseases, the activities of the bureaus of industrial hygiene or bureaus of occupational diseases (usually connected with the various state departments of health) have become an important consideration.¹⁴ This phase of the work has become possible through the allocation of funds set aside for this specific purpose by the provisions of the Social Security Act. The following states have Bureaus of Industrial Hygiene in the State Departments of Health: New Hampshire, Vermont, Connecticut, Maryland, Rhode Island, Pennsylvania, West Virginia, Virginia, North Carolina, South Carolina, Tennessee, Mississippi, Ohio, Michigan, Illinois, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Texas, and California; two states, New York and Massachusetts have such bureaus in the Department of Labor. The principal activities center around industrial hygiene surveys of operating conditions and advice regarding control of these conditions, offered to various employers.

As examples of these activities, reference is made to TABLES XII and XIII, the former showing the activities of the Bureau of Occupational Dis-

eases of the State Department of Health of Connecticut¹⁵ during the year 1935, and the latter showing similar but briefer data regarding the experience in Massachusetts¹⁶ during 1935.

It is believed that such information will be of considerable value to the employer for purposes of prevention and control, when carefully considered and judiciously applied. Connecticut,¹⁷ however, has seen the wisdom of limiting the uses of this information as expressed in the Public Health Statutes of the State (Section 2423) and briefed as follows: "... Said department is also authorized to study and provide advice in regard to conditions that may be suspected of causing occupational diseases, provided information obtained in accordance with the provisions of this section shall not be admissible as evidence in any action at law or in any action under the Workmen's Compensation Act."

Pending Legislation

THE evaluation of the significance of pending legislation with regard to occupational disease disability compensation is an extremely difficult task. In some states there are several bills pending, while in others there is only one regulatory scheme proposed for consideration. Here again, it is only possible to call attention to a limited number of bills and let these serve as examples.

CONNECTICUT (Bill H 640)—Proposes to require every physician having knowledge of any persons suffering from poisoning from lead, phosphorus, arsenic, brass, wood alcohol, or mercury, or from anthrax or compressed air illness, or any other disease contracted as a result of employment, to report the facts within 48 hours after obtaining such knowledge to the State Department of Health. The bill proposes also that physician making such a report shall receive a fee of 50 cents from the State Department of Health.

CALIFORNIA (Bill A 2029)—To amend the workmen's compensation act, proposes to make silicosis, asbestosis, and pneumoconiosis compensable under certain conditions.

DELAWARE (Bill H 88)—To amend the workmen's compensation act, proposes to make compensable "such disease or infection as naturally results directly from employment."

NEW YORK (Bills A 1179 and S 672)—To amend the workmen's compensation law, propose to define an occupational disease as a disease which is the natural and unavoidable result arising from conditions that are characteristic of and peculiar to, a particular trade, process, occupation or employment in which the employee was employed or engaged.

OHIO (Bill H 71)—To amend the workmen's compensation act, proposes to add silicosis to the list of compensable occupational diseases. The bill proposes, however, that a workman shall not be entitled to benefits for the contraction of silicosis unless he has actually been exposed to silica dust in his employment in the state for periods amounting in all to at least five years preceding his disablement.

Table XII.

BUREAU OF INDUSTRIAL HYGIENE ACTIVITIES CONNECTICUT (1935)

A. PLANT SURVEYS (Total 145)			
Foundries	39	Dust, organic	5
Lead	27	Mercury	5
Chlorinated naphthalene	10	Electroplating	4
Solvents (misc.)	8	Carbon monoxide	4
Rock drilling	6	"General"	13
B. TECHNICAL STUDIES			
Dust			20
Lead			3
Carbon monoxide			3
Chlorinated naphthalene			3
Mercury			1
Nitrogen oxide			1
Solvent vapors			1
Total			34

Table XIII.

BUREAU OF INDUSTRIAL HYGIENE ACTIVITIES MASSACHUSETTS (1935)

Total visits to industrial establishments.....	105		
	Fumes	Dusts	Total
Field determinations	72	74	146
Laboratory determinations	476	174	650
Total	548	248	796

MICHIGAN (Bill C 106)—To amend the workmen's compensation act, proposes to make compensable occupational disease arising out of and in the course of an employment. The bill proposes to define an occupational disease as a disease which is due to causes and conditions which are characteristic of and peculiar to a particular trade, occupation, process or employment.

MICHIGAN (Bill H 192)—To amend the workmen's compensation act, proposes to make compensable some 14 stated occupational diseases and poisoning from some 13 stated substances.

MASSACHUSETTS (Bill H 1200 Appendix LVI)—Proposes to establish a commission of five members, to be appointed by the governor, to investigate and study all aspects of occupational diseases and any methods or ways of reducing or controlling the hazard or likelihood of contracting occupational disease.

MINNESOTA (Bill H 611)—To supplement the workmen's compensation act, proposes to make pneumoconiosis a compensable occupational disease, and to define pneumoconiosis as a disease due to breathing air containing dust either organic or inorganic.

PENNSYLVANIA (Bill S 7)—To supplement the workmen's compensation act, proposes to make disabilities resulting from a number of stated occupational disease compensable, among which are poisoning by lead, mercury, phosphorus, arsenic, methanol, carbon disulphide, naphtha, volatile halogenated hydrocarbons, manganese dioxide, brass, zinc, benzol, (benzene) and nitro- and amido-derivatives of benzol; compressed air illness; destruction of tissue by radium or x-rays; chrome ulcerations; epitheliomatous cancer or ulceration of the skin or of the corneal surface of the eye resulting from the handling or use of tar, pitch, bitumen, mineral oil or paraffin; infection or inflammation of the skin resulting from the handling or contact with oils, cutting compounds, lubricants, dusts, liquid fumes, gases or vapors; anthrax, silicosis, and chronic incapacitating miners' asthma.

Suggestions of the American Bar Association

IT IS significant that the American Bar Association has critically studied the question of legislation for occupational disease disability and has made certain pertinent suggestions as published in the Report of the Section of Insurance Law, dated February 16, 1937.¹⁸ Although it is only possible to summarize the excellent treatment of this subject, some of the more important suggestions are as follows:

1. *Schedule system* including anthrax; brass or zinc poisoning; lead poisoning; manganese poisoning; mercury poisoning; phosphorus poisoning; poisoning by carbon bisulphide; methanol, petroleum or petroleum products, or volatile halogenated hydrocarbons; poisoning by benzol or any derivative of benzol; chrome ulceration; compressed air illness; dermatitis, that is, infection or inflammation of the skin on contact surfaces due to oils, cutting compounds, or lubricants, dust, liquids, fumes, gases or vapors; epitheliomatous cancer or ulceration of the skin or of the corneal surface of the eye due to tar, pitch, bitumen, mineral oil, or paraffin, or any compound, product or residue of these

substances; radium poisoning or injury by x-rays; blisters due to use of tools or appliances in the employment; bursitis of the knee or elbow due to intermittent pressure in the employment; miners' nystagmus; bone felon due to constant or intermittent pressure in the employment; synovitis and tenosynovitis caused by repetitive or intermittent traumas in the employment; carbon monoxide poisoning; poisoning by sulphuric, hydrochloric or hydrofluoric acid; tularemia; glanders; silicosis, asbestosis.

2. *Special provisions* relating to particular diseases (silicosis—asbestosis—tuberculosis).

3. *Medical Board*—three members, one a roentgenologist—term of six years.

4. *Bureau of Industrial Hygiene* in the State Department of Health.

General Discussion

IT SEEMS desirable at this point to digress somewhat from a consideration of the material which has been heretofore set down in this paper. This is done because there are certain corollary principles which have a definite relationship to medicolegal problems with regard to occupational diseases and which should receive some consideration.

Under the heading of general discussion, therefore, I want to point out rather briefly certain principles involved, especially regarding the responsibility of the physician; the responsibility of the employer; the problem of disability; and present methods of adjudication of claims.

RESPONSIBILITY OF PHYSICIAN: Industry and the legal profession quite naturally look to the physician to work out the etiology, diagnosis and differential diagnosis in occupational disease problems.

Etiology has been a most neglected factor as evidenced by the repeated review of the medical records of hospitals, dispensaries and plant physicians.¹⁹ It is not expected that the physician become an engineer, but it is respectfully recommended that he take enough interest and inform himself sufficiently so that he will learn to establish etiology in occupational disease problems upon just as scientific a basis as has been previously used in regard to similar situations in communicable diseases, where bacteriology plays so prominent a part, and also in surgical diseases or injuries in which the mechanism of the provocative agent has been thoroughly studied and demonstrated.

Further, it is my contention that the etiology of occupational diseases is just as much a part of the doctor's responsibility in working out these problems, as the etiology of non-occupational or non-industrial diseases.

It is also rather difficult to understand how the physician may come to a correct diagnosis and also give differential diagnosis the proper consideration, if he does not work out thoroughly the etiological factors.

It can, therefore, be concluded in regard to etiology, that it is because of neglect of such studies, that a great many of our medicolegal controversies arise.

In the diagnosis, the physician is confronted with a similar problem. In the average medical experience, the physician so often sees well-established disease, instead of observing so-called "normals" or "near-normals." The latter types of individuals are very commonly seen in industry in routine

surveys and it is in this work that it has apparently been so easy to misinterpret the findings. Furthermore, such misinterpretations are again misinterpreted by industrial laymen, too often resulting in the discharge of able-bodied employees.

It is evident then, that in evaluating industrial exposures, the physical examination, clinical laboratory and x-ray findings, one must know and be able to interpret the slight deviations from the normal and also to recognize when changes occur within the normal range of variation; evidence of gross pathology or gross changes can even be observed by those not medically trained, although not properly interpreted; real expertness lies in judgment, experience and discrimination applied to insignificant changes. This is in truth, the real basis for much of our present difficulty in diagnosis, especially as applied to medicolegal cases.

Differential diagnosis has been and will continue to be one of the most important problems in the discussion of medicolegal claims. Here, it is vital that the physician depend upon special tests and diagnostic criteria which are characteristic. Such methods are really available, although not used to anywhere near the extent that they should be—hence the real source of difficulty in differential diagnoses.

The principle of proper and adequate interpretation of technical reports and data is also very important. I have previously said in another paper:⁴ "It means practically nothing to the manufacturer to tell him that he has dust in his plant containing 50 million particles per cubic foot of air, that the free silica content of this dust amounts to 35%, and that a particle size distribution study shows that the majority of the particles are below three microns in greatest diameter. Nor does it do him much good to find out that he has in certain processes a lead-in-air content of 10 milligrams of lead per 10 cubic meters of air, or a concentration of 1500 parts of carbon monoxide per million parts of air. What the manufacturer desires to know is what the significance of these measurements is, and what they mean in terms of possible occurrence of disability among his employees. Someone must, therefore, explain these things to him promptly and understandingly. Similarly, insurance company representatives, including engineers, claims men, and underwriters, also ask the same questions. The engineers want to know just what exposure would be safe and, if it isn't safe, what to do about it. The underwriting group wants to know whether plant 'A' as surveyed is a good risk to put upon the books, judging from present and previous industrial conditions and also the present and past physical conditions of employees. Attorneys and members of industrial commissions and their associates desire to know whether a given set of industrial conditions is an actual occupational disease hazard—whether the employee actually has the occupational disease in question—whether such disease was contracted in the plant where the employee worked."

It is, therefore, evident that there must be someone who can integrate information relative to the industrial exposure and in regard to the effects of such exposure, so that the final expression will occur in terms of cause-and-effect relationships. I cannot see any other way than that the physician should become the real interpreter of the etiologic, diagnostic and differential diagnostic data.

Assuming this, the challenge to organized medi-

cine is much greater than most people realize. As I told the Section on Preventive and Industrial Medicine and Public Health at the 81st Annual Session of the American Medical Association here in Detroit seven years ago²⁰: "The answer is largely one of standards of excellence. One must go back to the student in the medical school. Curriculums should be so constructed and arranged that the medical student will be exposed to the fundamentals of industrial medicine. Not only must the undergraduate be provided for, but the postgraduate courses should be so correlated and so organized that greater opportunity will be presented for the promulgation of the basic fundamentals of industrial hygiene among the established practitioners . . . The physician is and always will be the leading figure in the field of industrial health; as a professional technician he has gained recognition, but as an administrator, it must be said that he has not clearly seen his responsibilities or his opportunities . . . Industry will not brook dictatorship, but medicine must officially present a united front if it would continue to assume responsibility and leadership in industrial medicine."

RESPONSIBILITY OF EMPLOYER: In discussing the responsibility of the employer, I am again obliged to quote from a previous paper²¹: "The wise employer has no intention of evading compensation for actual and typical occupational disease, but should not be compelled to pay for non-occupational diseases which have no definite relationship to employment. The greater use of industrial hygiene surveys, routine and special physical examinations, with proper interpretations, will put the manufacturer in a position to know what he has in his plant, which may ultimately lead to the contraction of occupational disease. All of this material needs proper and adequate interpretation, however, for its efficient use. Mention should be made of the fact that prevention is the real keynote and the hub of the wheel, for the proper functioning of a manufacturing plant, with regard to occupational diseases of all kinds."

In regard to the cost of acquiring proper information, I have also previously said⁸: "The employer is sometimes rather concerned about the cost of industrial hygiene surveys and physical and laboratory examinations. Enough of this work has now been done in this country in various types of industries to say that whereas the cost of these procedures will run into hundreds of dollars, the cost of defending one case at common law and paying a judgment, or the cost of one claim will run into thousands of dollars. This then, is truly a problem of industrial economy and becomes one which should be handled with the same amount of intelligence as a production problem. Will the intelligent industrial executive adopt a *laissez faire* attitude and merely let things go, or will he find out what he has in his plant in the way of possible potential occupational-disease hazards and also what the condition of his men is? Or, will he wait until he is forced to pay damage claims? It would seem that the ingenuity, the resourcefulness, the courage of the American industrial executive could be used in this problem as in other industrial problems, avoiding greater expense in the future, to say nothing of the suffering, disability and unemployment on the part of his employees."

Continuing with the responsibility of the employer and also from the same source, I have pre-

viously said: "No momentous court decision, no amount of political adventure, not even the most intelligently framed and administered state laws will solve these problems. Such problems as these are now being solved in plants, in the laboratory, and the examination room by accepted and up-to-date scientific methods. The responsibility belongs to the employer for the securing of information as to exactly how he stands, so that he may know what methods to adopt in the future. The responsibility belongs to no one else primarily, not to the city, not to the state, nor to the nation. It is up to the employer to select the most intelligent professional and non-professional advisers that he can obtain and no amount of money or time spent judiciously will be anything but a wise investment for the future."

THE PROBLEM OF DISABILITY: It has been increasingly evident in estimating the disability due to occupational disease that there is great necessity for the use of objective evidence rather than depending upon symptomatology and physical findings which are commonly not characteristic. The essential basis for the scientific estimation of disability is dependent, therefore, upon objective criteria rather than subjective findings.

As stated by Dr. May Mayers²² of the New York State Department of Labor, Industrial Hygiene Bureau: "At the present time we are frequently unable to diagnose these early cases solely on the basis of physical examination—however thorough this may be. We require laboratory tests to assist us, because with their aid we are able to detect characteristic or diagnostic bio-chemical reactions taking place in the body under specific conditions. And we can in many instances, relate those changes specifically to those conditions. Thus we make examinations of the blood, the urine, the feces, the spinal fluid, etc." Dr. Mayers may well also have applied this same principle to cases which are not really "early" cases but which are well-established cases of occupational disease.

Dr. Mayers has also made the following comments in the same article, in speaking about the expense of such tests: "Nevertheless the acquisition of such scientific data is of the essence. Its contributions are two-fold. It provides (1) data as to pre-clinical manifestations of disease without which a truly effective preventive program in industry cannot be developed; and (2) data by means of which greater accuracy in the differential diagnosis of compensation cases can be attained, making possible the expression of more positive medical opinion as to causal relation."

Because silicosis is such an important occupational disease and has been written about so much in the literature, it may be advisable to say a few words about disability in silicosis. The disabling factor in silicosis is infection—in the majority of instances, tuberculosis. It would, therefore, appear that any program calculated to promote the early discovery of tuberculosis in industrial workers, would eventually reduce the occurrence of disability consequent upon the contraction of silicosis. It is an accepted fact that early lesions of tuberculosis can be recognized in x-ray films months before causing characteristic symptoms and signs. The need for a properly conducted program of periodic examinations of industrial employees is thus established, if huge monetary losses, needless litigation, disability and suffering are to

be controlled. Clearly, those who oppose such a program are shouldering greater responsibility than they realize.

METHODS OF ADJUDICATION OF CASES: It is apparent that the ideal method of adjudication of cases is not in existence at present or has not yet been discovered.

Three general methods of adjudication are in use: hearings before industrial commissions; damage suits before courts of law; and by the use of medical boards.

In the commission hearing, the arbitrator or referee rules on the admission of evidence. He is thus vested with a great deal of power in this regard. The evidence so admitted is recorded and sent to the commissioners who make the final decision. Here we have then, a body of non-medical men who are hearing evidence and also ruling upon it.

In damage suits in courts of law, we have the trial-by-jury system. Here again we have a group of non-medical persons who are likely to be very much less well-informed than are arbitrators, referees and commissioners. However, particularly in Federal courts, the judge can exercise a great deal of choice in commenting on the evidence as well as asking questions to bring out important points. In cases on review, it will be found as before stated, that the opinion of the court represents very intelligent consideration.

In using a medical board, we are giving an example of the only kind of adjudication where medical men are used officially in a specific capacity. Here again, however, we are somewhat limited in achieving competent adjudicatory results usually because of the lack of money to pay properly and adequately informed medical men for such positions.

In a situation where there appears to be so much difference of opinion and lack of general information, it seems advisable to make a suggestion for a practical plan of adjudication of cases. Might it not be feasible in each case, for the commission or the court to appoint one or several recognized specialists with proper background and training, to act in an official capacity in each instance?

Conclusions

RETURNING now to the statistical and legal material presented in this paper, if we assume that these experiences can be accepted as typical, we may conclude that:

1. *Prevention* is the most important consideration.

2. There is great necessity for the meticulous choice of words in making adequate definitions and adopting standard terminology.

3. The majority of commission claims have been denied in one state in one year's experience (New York), chief causes of denial being "no lost time," "no medical evidence"—and "not covered by law," in order of frequency.

4. Occupational skin affections were by far the most frequent conditions encountered (69.4% in Ohio—66.0% in New York—61.3% in Massachusetts), the chief assignable causes being exposure to soap and water and various dyes or dye products. The disability period in these occupational skin cases has been shown to be a great deal longer than most people realize. In discussing this problem, Lane⁹ has stated: "As one of the medical

contributions to the solution of the problem of occupational skin diseases, it will be necessary to provide adequate training in this field in medical schools and in institutions with large skin clinics. Not only should there be courses provided for public health workers, but industrial physicians should have a proper opportunity of reviewing the knowledge of skin affections occurring in industry. A wider dissemination of the facts about these conditions is urgently needed." It might well be said that these same principles enunciated by Lane also apply to all other occupational diseases.

5. Certain experiences have shown "toxic fluids," "irritating dusts and fibers," "toxic vapors, gases and fumes" as important frequent causes of occupational diseases. (Wisconsin). As examples of specific conditions, "tenosynovitis" and "lead poisoning" may be added. (Ohio).

6. The "cost" of occupational diseases, generally estimated as approximately 2% of the cost of all compensation, has nevertheless never been adequately studied and computed. Although "toxic vapors and fumes" — "germs" — and "irritating dusts and fibers" cost above the average per case for indemnity in one state (Wisconsin), we must remember that there are "hidden" costs of occupational diseases, vitally affecting all the financial outlay—these must be included before we have the real facts.

7. The fact that no cases of occupational diseases have been reported, corresponding to certain schedule provisions, even for a considerable period of time (Ohio), is significant for that state only. The factors influencing such data are highly variable in the different states and must be considered in each instance.

8. As revealed by experience in one state (Connecticut), there is considerable discrepancy between the cases reported by physicians and the cases compensated but not reported. Statutory provisions are anticipated in Connecticut to cope with this situation.

9. At present, occupational disease disability is compensable by law in the District of Columbia and 18 states, as previously named. The so-called "schedule" plan is most frequent (9), with "blanket" coverage next (6), and the use of the word "injury" including occupational disease, third (3). Common law right of recovery is an exceedingly variable factor (perhaps impossible of definite interpretation in some states) requiring special study and critical analysis.

10. Court decisions are essentially legal interpretations of the statutory provisions, and in some states include opinions regarding factual evidence. Generally speaking, such decisions reflect intelligent and mature consideration. Of obvious necessity, the character of recorded decisions is wholly dependent upon the occurrence of appeal from lower bodies.

11. The questions of medical boards and physical examinations are still in infancy—five states as mentioned have provisions for boards—three states have provided for better than the usual type of examinations.

12. Complaints in commission cases show great variety and are liable to be indefinitely worded. Allegations in damage suits conform fairly well to type, following certain traditional points.

13. The work of Bureaus of Industrial Hygiene in State Health Departments is an exceedingly im-

portant phase of investigation of the industrial environment. Judicious and limited use of resulting information, however, is an essential in avoiding embarrassing, delicate and strained relationships.

14. The trend of pending legislation is toward legal provisions for the reporting of occupational diseases; more accurate statutory definition of occupational disease; the adoption of the "schedule" system of compensation for disability; and the appointment of special commissions for the investigation and study of occupational diseases, especially relating to methods of reducing or controlling hazards.

15. The suggestions of the American Bar Association, (as already reflected in the legislation of a sizeable number of states) are significant in indicating the general trend in future legislative enactments.

16. Finally, and to reiterate—prevention is by far the most important phase of this whole subject.

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Industry as a Source of Disease

—The Character of the Various Industrial Hazards, and Their Relative Importance—

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Industry as a Source of Disease

—The Character of the Various Industrial Hazards, and Their Relative Importance—

INDUSTRY means a place of business; also, being busy.* That industry should be a source of disease, either in regard to place of business or the nature of one's application, is truly an anomaly or an artifact and not something in the natural course of events, as I shall attempt to point out below.

The source of disease in industry is covered by the term "industrial health hazard." The word *disease*, itself, I am going to use in rather a broad sense to include not only pathological states but also disturbed functions and non-conformities in anatomical and functional status. Outside of this there is an industrial or occupational disease rate for certain common afflictions which statisticians show is in excess of the standardized rate for all gainful workers combined.¹ Space forbids my discussing this here except for an occasional brief reference.

Health is a good old Anglo-Saxon word meaning, "Hale, sound, and whole in body, mind, and soul." Hence, it is the state of well-being, or the quality of life. The threshold of well-being varies rather remarkably between individuals and in the same individual from time to time. Life is a broad highway. A marker down the center and a soft shoulder with a ditch alongside are the lateral limits for safe going. Drivers swerve from shoulder to center and even beyond these limits much too often, and this is when mishaps if not disasters occur. Usually, however, they swerve back successfully. This variation in thresholds Cannon² calls "homeostasis." Freely translated this means the ability of man to "stay put," despite thresholds of anatomical and physiological limits varying from the average or swervings from side to side. In short, the so-called threshold limit for a given hazard is no more fixed than biology itself, and the great field of study for the future is why some are more susceptible and others more tolerant. Why, in the most striking disasters, do 70 to 80% of those exposed, nevertheless, escape? In fact, only the more susceptible ever suffer from occupational diseases. Precision methods are of course preferable but it must not be forgotten that they have only a relative value due to "homeostasis" in the individual.

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Our subject, *industrial health*, is but a phase of the general topic, "Hygiology." Usually it is classed as an environmental phase where-
as health also covers *personal hygiene*, the *physical status quo*, and even *eugenics*, or the source of well being.

Historical Background

TEXTBOOKS on occupational disease, dangerous trades, vocational hygiene, and industrial health cover this subject. The recent series of articles in *INDUSTRIAL MEDICINE* by Robert T. Legge³ have encompassed the subject in both a broad and a particular way from the earliest Biblical times to the present. For America⁴, in 1902, C. F. L. Doehring, a student of George M. Kober's at Washington, made the first official survey of industrial hygiene. This was done under the Hon. Carroll D. Wright, Commissioner of the Department of Labor, and the survey was made in the government shops in Washington. In 1905, Massachusetts was investigating its factories under Dr. William C. Hanson. In February, 1908, Dr. George M. Kober, while Secretary of Theodore Roosevelt's Homes Commission, published a volume upon the subject, *INDUSTRIAL AND PERSONAL HYGIENE*. In the same year valuable articles by Dr. George M. Price, Dr. C. T. Graham-Rogers, Dr. Frederick L. Hoffman, and Dr. W. Gilman Thompson began to appear.

In 1910, the Illinois Commission on Occupational Diseases finished its survey under the direction of Dr. Alice Hamilton and the guidance of Prof. Charles R. Henderson, Dr. Ludvig Hektoen, and others, and in June of the same year the First National Conference on Industrial Diseases met in Chicago at the call of the American Association for Labor Legislation under the guidance of Dr. John B. Andrews, Prof. E. R. Commons, Prof. Henry W. Farnam, and Dr. Henry B. Favill. Also, in New York City in 1910, Dr. Thompson started the first clinic on occupational diseases. This was followed in 1911 by the establishment of another at Rush Medical College, Chicago, by the writer, who had been with the Illinois Commission above mentioned.

Following these activities came those of the U. S. Bureau of Labor Statistics, the U. S. Bureau of Mines, the New York State Factory Investigation

* Presented at the Midwest Conference on Occupational Diseases, Detroit, Michigan, May 3, 1937.

Commission (under Price in 1912-1914) and others; also, the impetus given by the XV International Congress on Hygiene and Demography held at Washington in 1912. For a summary of more recent events, one should consult the special report of the Harvard Tercentenary Celebration on Environment and Man.⁵

The Industrial Health Hazards

IN INDUSTRIAL HEALTH HAZARD is any condition or manner of work which is beyond the threshold of physiological adjustment of the human being so engaged.⁶ It is to be noted that this physiology is adaptable by gradual tolerance to wide variations in environment and experiences, but subjection to conditions which are unnatural or beyond the threshold of physiological adjustment, including adaptability, results in pathology or disease (industrial or occupational disease).

These industrial hazards group themselves under 10 convenient headings:

1. The *poisons*—local, systemic, and constitutional.
2. *Mechanical irritants*, such as mineral or metallic dusts, producing dermatitis (often secondarily infected), or, when inhaled (and especially if there is an irritative solution in the pulmonary lymphatics), pneumoconiosis of various forms.
3. *Friction and pressure*, producing blisters, caloused places, worn teeth, bursitis, etc.
4. *Fatigue*, producing "nervous breakdown" or, when localized, synovitis, myositis, and other forms of strain, subluxations, avulsion, etc.
5. *Infections*, of which there are not many peculiar to industry itself but examples are, anthrax, glanders, tetanus, actinomycosis, and the very common "machinist's boils" associated with oils, greases, and cutting compounds—also, even such infections as typhoid fever, undulant fever, and tularemia where such occur from exposure on the job.
6. *Diseases following accidental injury* at work, such as secondary infections, deformities, and fibroses.
7. *Abnormal spectral conditions*, from the infra-red through the brilliant, or overly subdued "light" waves to and through the ultra-violet to x-rays and radium radiations, producing afflictions all the way from scorching, blistering, conjunctivitis, retinitis, ophthalmia, and nystagmus to bronzing, light burns, and epithelioma.
8. *Temperature extremes*, producing, on the one hand, thermic fever, heat retention, cramps, stroke, and collapse, and on the other, chilling followed by pneumonia, Bright's disease, etc., also local afflictions like frost-bite.
9. *Noise*, especially reverberating noises, which in time produce so-called "boiler-maker's deafness," and;
10. *Abnormal atmospheric pressures*, producing on the one hand, compressed air illness of several types, including local effects such as ruptured eardrums, and, on the other, "rarefaction disease," as in aviation, mountain climbing, and, we might include here, asphyxial states due to decreased percentages of oxygen in the air so that mechanical and chemical factors combine. While custom has classified these abnormal atmospheric pressures and asphyxial states as "diseases" they usually partake more of the nature of acute or accidental mishaps.

To summarize, a rapid method for spotting all usual health hazards in any industrial exposure, is to memorize 12 words or terms and apply them in the survey: Dust, Dirt, Dampness, Darkness, De-vitalizing Air Conditions, Temperature, Fatigue, Infections, Poisons, Compressed Air, Stimulantism, and Susceptibility.

In some cases these terms also conjure up their opposites. This opinionative method was used, I believe, with entire success in the Ohio Survey of Industrial Health Hazards and Occupational Diseases,⁷ 1913-1915, where a large number of industries had to be covered rapidly and with a small budget. McCord has competently discussed industrial hazards in his book "Industrial Hygiene for Engineers and Managers"⁸, and more recently in his paper on the "Industrial Hygiene Survey."⁹

The Occupational Diseases

IT IS with the greatest difficulty that "hoc proter hoc" reasoning can be kept out of the present discussion. That is, we are so very apt to look at the mishaps and wreckage along the highway, in the nature of morbidity and mortality statistics, and assume forthwith that they are results of hazards upon the highway, when, too often, as we well know, the hazards lie with the drivers and very often were there before they left home for the trip. Nevertheless, I feel at least obligated to classify some of the obvious results of these exposures to industrial health hazards which are known as "occupational diseases."

When the condition of "homeostasis" is passed, that is, the threshold of natural adjustment is overstepped, any of these mentioned hazards may produce functional disturbances, actual impairment, or death.

Thus, an *occupational disease* is any affliction which is the result of exposure to an industrial health hazard.¹⁰

A ready classification of occupational diseases, which correlates them with industrial health hazards, is the following four groupings:¹¹

1. The so-called *specific* or characteristic occupational disease, such as lead poisoning, silicosis, prepatellar bursitis, tenosynovitis, "machinist's boils," tar cancer, etc. In short, one or more quite characteristic occupational diseases can be named for each of the 10 hazards above enumerated.
2. *Diseases partly occupational*. These are afflictions where the hazards may exist elsewhere than in connection with the work, such as hereditary or congenital predisposition, pathological states, or faulty personal hygiene, bad living conditions, etc. For example, allergic asthma and dermatitis, tuberculosis, etc., can, at most, be no more than partly occupational in nature. Many diseases of the human body are occupational only to the extent that work may aggravate or re-activate the condition present. For example, the effects of heat cramp upon a duodenal ulcer, chronic pyorrhea as a sequella to benzol or lead poisoning, etc. Still the elimination of common, well-known health hazards would mitigate if not forestall the onward march of such afflictions.
3. *Occupational health complaints*. These are pre-disease conditions, such as headache, sleeplessness, dyspepsia, pain, numbness, stiffness, cough, etc. Being only symptoms and in themselves not true diseases, they are, nevertheless, the earmarks which should guide the industrial physi-

cian, engineer, chemist, and all health guardians to the elimination of possible industrial health hazards.

4. *Conditions* which are neither diseases nor complaints, but which may be advanced by one's occupation: Examples are, postural defects, such as flat feet and round shoulders, or faulty work habits, such as constant nodding of the head in rhythm with motions of the hands, etc.

Some Statistical Evidences

ACCORDING to the U. S. Census for 1930, there were, of gainfully occupied workers in the United States, 48,829,920, of whom 38,077,804 were males and 10,752,116 were females.¹² While a great depression slump has taken place in the intervening years, possibly amounting to 10 million who were thrown out of employment, I have seen some recent figures which place the present total employment at approximately 45 million.

were dislodged from their homes and often assembled in large numbers in many places, but with no increase whatever in communicable diseases of any nature.¹⁴ This is the more remarkable when we consider that this was in the midst of the winter season when the respiratory diseases are at their zenith, and it contrasts especially with the war period of 1917-19, when the respiratory diseases ran rampant. The situation is not so favorable, however, in working groups as will be shown below.

In the *British Journal of State Medicine*, for October, 1936, Dr. A. Massey,¹⁵ commenting on health and safety in the factory, found that time lost through sickness was much greater among works employees than among office staffs. For example, FIRM A had respective percentage losses per week as follows: Works employees 2.82, office staff 0.82; FIRM B, 3 vs. 0.4; and FIRM C, 2.25 vs.

TABLE I
SUMMARY OF COMPENSABLE OCCUPATIONAL DISEASES REPORTED 1928-1936, INCLUSIVE
OHIO DEPARTMENT OF HEALTH, BUREAU OF OCCUPATIONAL DISEASES

No.	Name of Affliction	1928	1929	1930	1931	1932	1933	1934	1935	1936	Total
1.	Anthrax.....	—	—	—	—	—	—	—	—	—	—
2.	Glanders.....	—	—	—	—	—	—	—	—	—	—
3.	Lead Poisoning.....	180	183	134	114	148	134	162	102	112	1269
4.	Mercury poisoning.....	—	—	—	—	—	—	—	—	—	—
5.	Phosphorus poisoning.....	—	—	—	—	—	1	—	—	—	1
6.	Arsenic poisoning.....	—	2	1	2	3	1	3	3	—	15
7.	Benzol poisoning (and nitro- or amido-derivatives).....	11	11	3	6	9	3	10	7	3	63
8.	Volatile petroleum products poisoning (gasoline, benzine, naphtha, etc.).....	3	4	2	6	5	9	10	7	5	51
9.	Carbon bisulphide poisoning.....	1	1	—	18	2	1	1	—	6	30
10.	Wood alcohol poisoning.....	1	—	—	1	—	—	—	1	—	3
11.	Dermatitis (infection or inflammation of the skin on contact surfaces due to oils, cutting compounds or lubricants, dusts, liquids, fumes, gases or vapors).....	894	985	884	833	621	726	913	875	930	7660
12.	Epithelioma (skin or eyes) due to carbon, pitch, tar or tarry compounds.....	3	2	1	5	1	1	—	—	—	13
13.	Compressed air illness.....	16	62	59	5	20	3	2	1	2	170
14.	Carbon dioxide poisoning.....	—	—	—	—	—	1	1	1	—	3
15.	Brass or zinc poisoning.....	7	5	2	10	2	12	8	3	—	49
16.	Manganese dioxide poisoning (1).....	—	—	—	—	—	—	—	—	—	—
17.	Radium poisoning (1).....	—	—	—	—	—	—	—	—	—	—
18.	(a) Tenosynovitis (hand) (1).....	—*	37	130	166	149	191	228	218	178	1297
	(b) Prepatellar bursitis (1).....	—*	13	23	29	23	19	27	25	27	186
19.	Chrome ulceration (nasal and skin) (2).....	6	10	20	16	79	20	43	40	79	322
20.	Potassium cyanide poisoning (2).....	3	2	—	1	3	5	—	1	2	17
21.	Sulphur dioxide poisoning (2).....	2	—	—	5	4	2	7	1	2	23
Total.....		1127	1317	1259	1217	1069	1129	1415	1294	1346	11172

* Statistics not kept on Tenosynovitis and Bursitis in 1928. Both of these afflictions had been compensated as "accidental" injuries previous to July 1, 1929.

(1) Added to compensable list July 31, 1929, by Legislative Act, 89th General Assembly.

(2) Added to compensable list July 9, 1931, by Legislative Act, 90th General Assembly.

A decade or two ago mid-life was the safest age, while death rates were high for the child and youth as well as for the aged. However, things have shifted remarkably, and the safest age is now in the period of youth and the safest year that of age 11.¹³ Even here, accidents cause 36.8% of the deaths of boys and 11.4% of the deaths of girls. The Census covers gainful workers from 10 years of age onward.

Man's recent and rapid control of the communicable diseases in civilized countries is no doubt the chief cause of this shift. This control is no better illustrated than in the situation created by the great Ohio River flood of January and early February this year when possibly 1,500,000 persons

1.5. These were large engineering firms in Coventry, employing from 2066 to 2391 in the works and 368 to 500 in the office. The author, in searching for an explanation, observed that office workers were often drawn from more educated groups than manual workers and accordingly were better versed in the practice of personal hygiene. They also enjoyed in the main better home environment. Again, initial selection as to suitability for their jobs was more systematic in the case of the office staff, and they had more permanent terms of employment. Furthermore, the larger number of works employees increased the chances of both importation and spread of infections while the hazards appertaining strictly to

occupation were, of course, greater among work employees.

Ohio Occupational Disease Statistics

THE PERIOD 1913-1936: According to the official statistics compiled in Ohio over the period from May 15, 1913, to the end of 1936, a total of 20,296 occupational diseases was reported.¹⁶ Of these 2,575 occurred in the eight years prior to the time compensation for occupational diseases began (August 4, 1921), or an average of 322 cases a year; since compensation began (15.4 years), 17,624 cases were reported, or a yearly average of 1,144 cases. Acute mishaps, even though due to poisons, corrosives, asphyxiants, etc., and incomplete reports are not included in any of these figures. In Ohio, occupational diseases are divided, for convenience, into the compensable group and the non-compensable group.

There are 21 causative agents listed in the schedule of compensable diseases. These are shown in the accompanying Table I. The first 15 of these were scheduled for compensation August 4, 1921, the next three, July 31, 1929, and the last three, July 9, 1931.

THE PERIOD 1928-1936 ANALYZED: A glance at TABLE I, which covers the 9-year period from 1928 to 1936 inclusive, shows a total of 11,172 *compensable cases*¹⁷ reported and that 7,660, or 68.6%, of these were due to dermatitis caused by "infection or inflammation of the skin on contact surfaces due to oils, cutting compounds or lubricants, dusts, liquids, fumes, gases or vapors". Broad as this coverage appears, it, nevertheless, omits industrial skin afflictions due to physical agents, viz., friction, heat, cold, light, and radiant energy of any form. It also omits perspiration-irritation.

The second leading cause comes under strain or fatigue, viz., 1,297 cases, or 11.6%, of tenosynovitis, involving the flexor or extensor muscles of the hand (only), and 186 cases, or 1.7%, of prepatellar bursitis, both of which afflictions were added to the schedule in 1929.

The third group of significance is lead poisoning with 1,269 cases in the nine year period, or 11.4% of the entire group.

The fourth group is chrome ulceration involving either the nose or the skin with 322, or 2.9% of the cases. Chrome skin ulcers, it will be observed, are scheduled separately from dermatitis in Ohio.

The fifth group is compressed air illness with 170, or 1.5% of the total cases, and occurring practically altogether in the first five of the nine years.

Thereafter follows benzol poisoning, including its nitro- or amido-derivatives, with a total of 63, or 0.6% of the cases, or exactly seven per year. This is followed by volatile petroleum products with a total of 51, or 0.5%.

The less significant causes of compensable occupational diseases were, in descending order: Poisoning by brass or zinc (49), carbon bisulphide (30), sulphur dioxide (23), potassium cyanide (17), and arsenic (15); then follows tar cancer (13), and finally three charged to poisoning by carbon dioxide, three to wood alcohol, and one to phosphorus.

It is notable that during this nine-year period there were no cases reported of anthrax, glanders, or poisoning by mercury, manganese dioxide, or radium. An analysis of the reported *non-compensable cases* is given below.

The Industry as a Hazard

I HAVE been greatly assisted by Dr. W. E. Masters, former Chief Medical Supervisor, and Dr. K. D. Smith, now Chief Medical Supervisor, of the Bureau of Occupational Diseases of the State Health Department, in compiling the following data for Ohio for the year, 1936.

The industries in which occupational diseases occurred are represented by the 1,453 cases reported for that year.¹⁸ We can give but the bare figures and not the rates since the number employed in each industry is not known, nor can it be closely estimated. You all know that Ohio is a state with extensive manufacturing, transportation, trade, mining and agriculture, also with extensive institutions and utilities. Steel, automobile, food, electrical goods, rubber, clothing, publishing, are all paramount industries. (See TABLE II). It has not been possible to observe a standard terminology in our use of the terms "industry" and "occupation" because we have had to rely upon the reports of physicians, very few of whom have any knowledge of a standardized terminology in this field and especially that recommended by the U. S. Bureau of Census.¹⁹

OCCUPATIONS OR TRADE PROCESSES AS A HAZARD: The Ohio occupational disease reports for the year 1936 were listed as shown in TABLE III, for occupations or trade processes.

AGENTS PRODUCING OCCUPATIONAL DISEASES: An Ohio law of 1913 (Section 1243-1 to 5, G.C., Ohio) makes all occupational diseases reportable (by the attending physicians) to the State Director of Health. The agents producing them are best classified by noting the types of diseases produced. Sexes, also the number of reporting physicians and employers, can be stated. Of the 1,453 cases reported in 1936, 249, or 16.3% were females; 1,248, or 83.7% were males. The percentage of females the preceding year was 20.3%, and in 1934 it was 18.6%.

This total of 1,453 cases was reported by 664 physicians, or approximately 7.3% of the 9,000 practicing physicians in Ohio. They were employed by approximately 833 different employers.

1. *The compensable cases* (Section 1465-68a, G. C., Ohio) are delineated in Table I. There were 1,346 cases in this group (92.6% of the total); 1,112 (82.6%) were males and 234 (17.4%) were females. For the nine-year period ending with 1936, the total compensable cases numbered 11,172. (See Table I).

In 1936, *dermatitis*, with 930 cases, constituted 64% of the total reported cases, and 68.4% of the compensable cases.

The *chief causes of dermatitis* were: Oils, greases and cutting compounds, 211; specified chemicals, 97; chemicals, not specified, 78; cleaning compounds, 65; plating and cyanide solutions, 59; paints, lacquers, enamels, varnishes, thinners and turpentine, 59; plants, flowers, vines, vegetables, grains and fruits, 52; petroleum and its products, 48; stains, dyes and dyed goods, 44; bakelite and other synthetic resins, 37; inks, blue prints, etc., 25; dusts, variously specified, 23; rubber, 21; lime and cement, 19; bakery and confectionary goods, 18; wool, fur, glue, hair, feathers, 17; irritants, not otherwise specified, 15; brass and zinc, 15; adhesive cement, 6; abrasives (polishing rouge), 6; leather, hides and shoes, 5; infestations, 4; fish and meats, 4; paste (not otherwise speci-

fied), and garbage and rubbish, only one each.

Lead poisoning comprised 112 cases, 10 more than in 1935. The occupations of the workers were as follows: Painters (general painting, 14; spray painting, 12; others 4), 30, compared with 15 in 1935 and 26 in 1934; foundrymen (moulders, etc., of non-ferrous metals), 23; storage battery workers, 18; enamelers of sanitary ware, 12; white lead

TABLE II.
INDUSTRIES ASSOCIATED WITH OCCUPATIONAL DISEASES IN
OHIO, YEAR 1936
Number of Cases Reported in Each

Industry	Total	Male	Female
1. Iron and steel products (mfg.)	176	162	14
2. Foods and confectioneries (mfg. and handling)	131	102	29
3. Electrical products (mfg.)			
Electroplating	66	64	2
Storage batteries	23	23	0
Appliances	41	35	6
4. Automobile and parts (mfg.)	124	108	16
5. Tools, metal stampings, machine products (mfg.)	95	70	25
6. Rubber products (mfg.)	82	65	17
7. Institutions (public and semi-public)	60	49	11
8. Machinery (mfg.) (n.o.s.)	49	45	4
9. Construction (buildings, roads, etc.)	48	48	0
10. Cloth, clothing, dyed goods (mfg.)	44	30	14
11. Printing and publishing	40	35	5
12. Synthetic resins (mfg.)	37	30	7
13. Glass (mfg.)	36	33	3
14. Foundry products (non-ferrous) (mfg.)	31	30	1
15. Wood products (mfg.)	30	24	6
16. Unclassifiable	29	24	5
17. Retail merchandising	27	11	16
18. Chemicals (mfg.) (n.o.s.)	27	25	2
19. Window shades (mfg.)	21	0	21
20. Leather, shoes, and leather goods (mfg.)	21	15	6
21. Sanitary ware (bath tubs, sinks, etc.) (mfg.)	21	18	3
22. Paints, lacquers, varnishes, etc. (mfg.)	20	20	0
23. Clay products (mfg.)	17	14	3
24. Alcoholic beverages (mfg.)	16	12	4
25. Public Utilities			
Gas and Electrical	8	8	0
Common carriers, railways, buses, etc.	8	8	0
26. Stoves (mfg.)	15	15	0
27. Farming, horticulture, gardening, etc.	14	12	2
28. Laundry and dry cleaning	14	10	4
29. Roofing and roofing materials (mfg.)	12	12	0
30. Auto sales and service	11	11	0
31. Paper and products (mfg.)	10	5	5
32. Beauticians	8	2	6
33. Bicycles	7	6	1
34. Caskets and vaults (mfg.)	7	7	0
35. Plumbing supplies and plumbing (mfg.)	7	7	0
36. Coal mining and dealing	7	7	0
37. Mfg. of petroleum products and dealing	5	5	0
38. Dental supplies (mfg.)	4	1	3
39. Saw mill and planing products (mfg.)	4	4	0
40. Carbon, coke products (mfg.)	4	3	1
41. Musical instruments (mfg.)	3	3	0
42. Banking	3	2	1
43. Vegetable oils (mfg.)	3	3	0
44. Cigars, tobacco (mfg.)	3	0	3
45. Matches (mfg.)	3	1	2
46. Raincoats (mfg.)	2	1	1
47. Grass mats (mfg.)	2	0	2
48. Soap (mfg.)	2	2	0
49. Junk dealing	2	1	1
50. Warehousing	2	2	0

One case was reported in each of 20 other industries.

workers (manufacturing white lead), 8; printers, electrotypers, lithographers, etc., 5; automobile manufacturing and repairing, 5; manufacturing steel and its products, 4; glass workers, 3; clay products workers, 2; window putty and junk worker, 1 each. Three women incurred lead poisoning, two in decorating glassware, one employed making bolts and nuts. In the eight years (1928-1935, inclusive), 71 deaths were associated with lead poisoning, 10 occurring in 1935 (figures for 1936 not yet available).

There were also reported 79 cases of *chrome ulcers*, 24 occurring in women. The nasal mucosa was affected in 44 and the skin in 35.

Other compensable poisonings totaled 18; carbon bisulfide, 1, and its derivatives (carbon tetrachloride, 4; butyl acetate, 1) (two females), 5; petroleum products, 5; benzol, 3; potassium cyanide, 2; sulfur dioxide 2.

Tenosynovitis of the hand (wrist) registered 178 cases, of which 57 were females; *prepatellar bursitis* or "housemaid's knee", 27 cases, only two occurring in females.

Compressed air illness ("caisson disease") accounted for two cases in sewer construction work.

The following compensable diseases reported no cases: Anthrax, glanders, epithelioma or skin cancer, and poisoning by mercury, phosphorus, arsenic, wood alcohol, carbon dioxide, brass and zinc, manganese dioxide, radium.

2. The 107 non-compensable occupational diseases reported, including 15 females (6 with constitutional symptoms), are of considerable interest. Dusts were responsible for 40; variously specified fumes and chemicals, 25; tenosynovitis (other than wrist) from repetitive motion, 8; infections, 10 (undulant fever, 2; tularemia, 4; tuberculosis, 3; Vincent's type organisms, 1); pressure 3; lifting, 2; acids, 2; chrome (constitutional), 2; cyanide poisoning (other than the compensable potassium cyanide), 2; heat (thermal dermatitis), 2; chronic carbon monoxide poisoning, 2; the rest, scattered causes.

Analysis of the 40 dust cases reveals pneumoconiosis in some form was the cause in 30 cases (only a few checked by the Department*); Silicosis, 14; silicosis with siderosis, 4; silicosis with tuberculosis, 1; silicatoses, 1; pneumoconiosis, not otherwise specified, six. In the remaining 10 cases, inorganic and organic dusts caused upper respiratory and conjunctival irritation. The dusts causing the pneumoconioses arose chiefly in foundries, mines, sandblasting and clay industries. At the end of the year, an inquiry was made of the 21 tuberculosis institutions in the State. Of these, six reported upon pneumoconiosis in general. They specified 11 cases of silicosis exclusive of those enumerated above, and one sanatorium reported 35 additional pneumoconiosis cases, exclusive of silicosis. Among the tuberculosis institutions, Hamilton County (Cincinnati), the largest (635 beds), also Franklin County (Columbus) (210 beds), reported no case of any form of pneumoconiosis.

Undulant fever showed two cases and tularemia four cases, considered as industrial in origin. There was one case of each in 1935.

During the nine-year period, 822 non-compensable cases were reported, of which 596 were

* In the diagnosis of silicosis and other pneumoconioses, this Department has followed the recommendations of the Committee on Pneumoconiosis of the American Public Health Association as rendered in the *Year Books*, 1931-32 (p. 131), 1932-33 (p. 100), and 1935-36 (p. 65).

"agent" cases and 226 were "afflictions" (agent not specified). Of the 822, approximately 274 were due to inhaling dusts, 11 were asthma, 70 were tuberculosis (alleged industrial) and the balance scattered.

Summarizing the 1,453 cases reported in 1936, 969 occurred by way of the skin, 251 chiefly by in-

haling substances, 188 through strain, 30 by pressure or friction, and 15 by other means.

Acute mishaps (31) even though due to poisons, corrosives, asphyxiants, etc., *non-occupational diseases* (7); and *incomplete reports* (9) are not included in any of these figures.

In 1936, one plant physician reported 79 cases, 4 industrial physicians reported between 31 and 40 cases each, and three reported between 21 and 30 cases each. It can readily be seen that private physicians reporting but one or two cases made up the vast majority.

PNEUMOCONIOSIS REPORTS ANALYZED BY INDUSTRY: In Ohio, 284 cases of pneumoconiosis were officially reported in the 10-year period, 1927-1936. In 1931, Dr. Byron E. Neiswander²⁰ of the Ohio Health Department analyzed 59 cases of pneumoconiosis from 26 localities, giving the industries and occupations involved. These cases occurred between 1927 and 1930, inclusive. To these I have added 54 more Ohio cases occurring between 1931 and 1936, inclusive. TABLE IV shows the sources of these 113 cases by industries, and TABLE V, by occupations. The manufacture of iron and steel, and of pottery and refractories' products lead the industries, while sandblasters and pottery workers lead the occupations. The numbers, of course, are small, and merely suggestive of the chief sources of pneumoconiosis.

SILICOSIS: In 1926 Kindel and Hayhurst²¹ made a study covering job, race, exposure, symptoms, and stereoscopic x-ray examinations of 912 sandstone workers in a 50-year old industry at South Amherst, Ohio. This was accompanied by a chemical, minerologic, petrographic, and comparative tuberculosis study.²² Of these 912 men, pulmonary pathology was found 55.1%, including 28.5% with silicosis in various stages. The total tuberculosis, however, was but 1.9%. Likewise, general disability was low. The tuberculosis findings checked relatively closely with the tuberculosis statistics of the community. A check-up in 1932 of the County tuberculosis records revealed that only five deaths had occurred from tuberculosis among those workers, still resident, in the intervening six years, and but five active cases were on record.²³ In the next five years only some 12 to 15 additional cases of tuberculosis have been reported among these workers. Silicosis with low incidence of tuberculosis is reported in case reports in both of the last triennial summaries from South Africa (2 out of 20,000 men, etc.) and relatively low in post-mortem findings 20-30%, etc.²⁴ The same is true in reports from other parts of the world. Theoretically the two diseases should be antagonistic, but the mass of older evidence, in particular, is all to the contrary. Evidently the matter needs more investigation. The average period for developing silicosis was 16.24 years, in our sandstone inquiry. The rock had an average content of 92.15 to 97% crystalline silica (SiO₂). Of the total number, 409 were essentially negative, 238 had increased fibrosis, 180 beginning silicosis, 45 moderate silicosis, 22 far advanced silicosis, 13 silicosis with tuberculosis, and five were tuberculosis alone.

While the men in our study ranged from 17 to 73 years of age, few under 25 had silicosis, but at 34 years of age and after 44 years of age, there were usually as many and sometimes more silicotics than non-silicotics at each year of life. Years

TABLE III
OCCUPATIONS OR TRADE PROCESSES ASSOCIATED WITH
OCCUPATIONAL DISEASES IN OHIO
Year 1936—Number of Cases Reported in Each

Occupation	Total	Male	Female
1. Machinists, machine operators, mechanics.....	291	265	26
2. Electroplaters.....	145	116	29
3. Painters, enamellers.....	127	117	10
4. Food handlers, bakers, and confectioners.....	92	64	28
5. Rubber workers.....	76	60	16
6. Cleaners, janitors, etc.....	65	47	18
7. Iron and steel workers (n.o.s.).....	64	63	1
8. Laborers (n.o.s.).....	62	62	0
9. Dyers, handlers of dyed cloth and clothing.....	36	22	14
10. Glass workers.....	36	31	5
11. Synthetic resins (bakelite, etc.).....	34	27	7
12. Printers, book binders, publishers, lithographers, electro-typers.....	30	26	4
13. Foundry men (non-ferrous).....	25	25	0
14. Chemists and chemical workers.....	23	20	3
15. Foundry and machine shop workers.....	22	19	3
16. Storage battery workers.....	21	21	0
17. Clerks, retail merchandising.....	21	8	13
18. Window shade workers.....	20	0	20
19. Grinders, sanders, and treaters (iron and steel).....	19	18	1
20. Photographers and blue-printers.....	19	19	0
21. Leather and shoe workers.....	19	12	7
22. Carpenters and wood workers.....	19	17	2
23. Construction workers (buildings, roads, etc.).....	18	18	0
24. Laundry and dry cleaning workers.....	18	13	5
25. Paper workers.....	15	5	10
26. Clay products workers.....	13	13	0
27. Electricians, workers in mfg. electrical equipment.....	13	11	2
28. Farmers, florists, orchardists, gardeners, etc.....	11	9	2
29. Chromate workers (mfg.).....	10	10	0
30. White lead workers.....	9	9	0
31. Beauty parlor operators.....	9	2	7
32. Miners (coal).....	8	8	0
33. Polishers and buffers.....	7	7	0
34. Institutions (public and semi-public).....	7	6	1
35. Oilers, oil, and petrol workers.....	6	6	0
36. Sand-blasters.....	5	5	0
37. Professional persons (doctors, dentists, musicians, etc.).....	5	3	2
38. Truck drivers.....	5	5	0
39. Unknown.....	5	4	1
40. Plumbers.....	5	5	0
41. Welders.....	5	5	0
42. Alcoholic beverage workers.....	5	4	1
43. Galvanizers and tanners.....	4	4	0
44. Auto workers (auto parts, repairs, service).....	4	3	1
45. Firemen.....	4	4	0
46. Roofers.....	3	3	0
47. Mineral wool workers.....	3	3	0
48. Dental supply workers.....	3	1	2
49. Mill hands not otherwise specified.....	2	2	0
50. Grass mat workers.....	2	0	2
51. Refrigerator workers and service men (elect.).....	2	2	0
52. Bank clerks.....	2	1	1
53. Glazers.....	2	2	0
54. Fertilizer worker.....	1	1	0
55. Window puttier.....	1	1	0
56. Solderer.....	1	1	0
57. Motorman.....	1	1	0

of exposure and certain jobs (grindstone and curbstone workers, saw setters, hookers, rockmen, etc.) were directly related to the incidence of silicosis, but race and work outside or within enclosures appeared to be of little significance.

Acute silicosis, or that occurring with a few weeks' to a year or two's exposure, was reported as early as 1713,²⁵ while an unusual outbreak was reported by W. W. Betts in Nevada in 1899,²⁶ involving hundreds of cases, and another at Gauley Bridge, West Virginia, in 1932-33.²⁷ Here a large amount of fine siliceous dust was involved, while dust-pneumonia and possibly acute tuberculosis occurred in many cases. The situation seems similar to the scourge to American soldiers while patrolling the Mexican border in 1915-16, and to the effects of dust storms in the Middle-West today. When it is recalled that there are three isotopes of silicon and some eight stabilities as regards temperature ranges in the natural formation of silica, the possible range in biologic effects of this

inspired air. There seems no doubt, however, of the association so far as cobalt-arsenic ores are concerned in Schneeberg, Germany.²⁸ Arkin and Wagner²⁹ found 72% of 135 cases of primary cancer of the lung to have occurred in men between 41 and 60 years of age, and only 10 to have occurred in women. Dr. George M. Curtis³⁴ says that, "at the present time the incidence of cancer originating within the lung is considered approximately 10% of all malignancies of the body." He is inclined to favor extraneous irritating substances as significant, including tobacco smoke and industrial dusts and irritants.

Lack of Interest on the Part of Labor

IN AMERICA, a truly anomalous condition prevails in that organized labor itself leaves the health question pretty largely to the individual worker. It does little in the way of educational

TABLE IV
SILICOSIS, SILICATOSIS, AND ASBESTOSIS BY INDUSTRIES IN OHIO
1927-1936, Special Cases Investigated
Ohio Department of Health, Bureau of Occupational Diseases

Industry	Number
1. Iron and steel products (mfg.)	38
2. Pottery, refractories, (1 brick, 1 cement)	21
3. Monuments, granite, stone (n.o.s.)	10
4. Coal mining (1 dealer)	9
5. Brass, other soft metals (mfg.)	8
6. Sanitary Ware	7
7. Sandstone	6
8. Auto accessories (n.o.c.)	5
9. Storage battery containers	2
10. Asbestos	2
11. 1 chemicals, 1 furniture, 1 glass, 1 live stock, 1 matches	5
Total	113

complex element and compound becomes apparent.²⁸ The literature is annotated in the recent three volumes of Davis, Salmonsens, and Earlywine;²⁹ also by Harrington and Davenport of the U. S. Bureau of Mines.³⁰

Changes in the Nature of Agent-Hazards

CERTAIN poisons, such as benzol, aniline, carbon bisulphide, and carbon monoxide, which were prominent 20 years ago, have largely disappeared as industrial hazards, no doubt chiefly because attention has been focused upon them, while others, especially new toxic agents, have taken their places.³¹ We see, daily, the paradox of a new method engineered to the last detail for production or perfection, with no thought given to a preliminary investigation of possible health hazards, with the result that employees become human guinea pigs far too often in establishing the hazards which arise. Of this, there have been several outstanding examples, such as distilled turpentine and tetraethyl lead in their early manufacture, radium in watch dials, and the silica-using or producing industries.

Whether or not primary cancer of the lungs is increasing because of the inhalation of irritating substances is a very controversial question at the present time. A suspicion has been cast toward silica dust as well as to irritating factors in the

TABLE V
SILICOSIS, SILICATOSIS, AND ASBESTOSIS BY OCCUPATIONS IN OHIO
1927-1936, Special Cases Investigated
Ohio Department of Health, Bureau of Occupational Diseases

Occupation	Number
1. Sandblasters	31
2. Pottery and porcelain workers	18
3. Grinders and polishers	11
4. Molders, foundry men	11
5. Coal miners	8
6. Monument makers	6
7. Quarrymen (n.o.s.)	5
8. Stonecutters (n.o.s.)	5
9. Clay mixer men	3
10. Furnace builders, repairers	2
11. Fire pit workers	2
12. Asbestos workers	2
13. One each of: gas (mfg.), machinist, assembler auto parts, welder, glassworker, cement worker, hog sorter, furniture sander, chemicals mixer	9
Total	113

or investigative work in the matter of occupational diseases as may be seen by a scrutiny of its various publications.

Accidents Versus Diseases in Ohio*

IN TABLE VI is shown the average number employed per annum, the number of accident claims (with fatalities), and the number of occupational disease claims (with fatalities) over the 10-year period, 1927-1936. The estimated average annual number of employers or establishments (not shown in the Table) was 40,772 during this period with extremes ranging from a low of 37,578 in 1933 to a high of 45,203 (estimated) in 1936.

The average number employed per annum was 1,058,040, with extremes ranging from 817,862 in 1932 to 1,278,992 in 1929.

The average annual number of accidents was 187,268, of which 1,037 were fatal. Accidents ranged from 129,101 in 1933 (of which 883 were fatal) to 260,485 in 1929 (of which 1,258 were fatal.)

The average annual number of occupational diseases was 1,258 (of which 27 were fatal), with

* I am indebted to Mr. Evan I. Evans (Actuary), Mr. C. C. Beasor (Statistician), and Mr. W. R. Scofield (Division of Labor Statistics) of the Industrial Commission of Ohio, and Professor Lester S. Kellogg, of the Department of Business Organization, Ohio State University, for the fundamental figures under this heading.

a range from 1,051 (including 22 fatalities) in 1927 to 1,445 (including 33 fatalities) in 1930.

Incidentally, in 1936, the average accident claim covered by the State Fund cost \$66.14, and the average occupational disease, \$114.35.

Of course, the very insignificant number of occupational diseases as compared to accidents is outstanding, and is clearly out of step with insurance data and employment sickness data as compiled by many observers. A partial explanation lies in the greatly restricted schedule set up by law in Ohio for compensating occupational

TABLE VI
EMPLOYMENT AND DISABLEMENT, OHIO, 1927-36.

Year	Average Number Employed	Number of Accident Claims		Number of Occupational Disease Claims	
			Fatal		Fatal
1927.....	1,171,267	218,946	(953)	1051	(22)
1928.....	1,197,885	228,020	(1078)	1213	(30)
1929.....	1,273,992	260,485	(1258)	1416	(37)
1930.....	1,133,846	211,305	(1225)	1445	(33)
1931.....	963,791	170,528	(1094)	1240	(40)
1932.....	817,862	130,379	(954)	1140	(29)
1933.....	854,991	129,101	(883)	1215	(23)
1934.....	980,594	158,022	(935)	1226	(21)
1935.....	1,068,456	163,316	(942)	1256	(20)
1936.....	1,112,720(est.)	202,580	(1048)	1376	(18)
Total.....	10,580,404	1,872,682	(10370)	12,578	(273)
Average per Year.....	1,058,040	187,268	(1037)	1258	(27)

disease claims, while, no doubt, the vast amount of sickness occurring among industrial employees, which was found by Sappington some years ago to amount to 20 times the number of cases of accidents and to cause seven times as much absenteeism, is very largely attributable to community factors and the mode of living.

Industrial Mortality Statistics

IN 1892, Sir Thos. Arlidge, in one of his Milroy Lectures,³⁵ stated: "The vital statistics of occupations can only be general and approximative. Mortality returns of themselves are insufficient to show to what extent the deaths in an occupation are due to its pursuit. They represent the number following that occupation who have died, and so afford a crude idea of the relative frequency therein of certain fatal forms of disease."

Those who are interested in this phase of the subject would do well to consult the Registrar-General's Decennial Supplement for England and Wales (Part II, Occupational Mortality),³⁶ and the more recently compiled statistics of Dean K. Brundage,³⁷ Rollo H. Britten,³⁸ and William M. Gafafer³⁹ of the U. S. Public Health Service, and the reports of Louis I. Dublin and his associates.

Jessimine S. Whitney,⁴⁰ statistician of the National Tuberculosis Association, showed that when deaths from all causes were arranged according to social-economic class in 10 selected states, in 1930, the *standardized death rate* for all gainfully occupied males per thousand was 8.70. For agricultural workers, it was only 6.21, professional men 7.00, proprietors, managers, and officials 7.38, clerks and kindred workers 7.40, and skilled workers and foremen 8.12; but for semi-skilled workers, it was 9.86, and for unskilled workers

13.10. Between 1910 and 1930, *tuberculosis*, the great criterion disease of environmental health conditions, receded from first to seventh place as a cause of death in the general population, but still stood in second place in 1930 for gainfully occupied males.

Rollo H. Britten,⁴¹ statistician for the U. S. Public Health Service, showed the major causes of excess mortality among unskilled workers as compared to all gainfully employed, taken as 100, was as follows: Tuberculosis 211, pneumonia 196, industrial accidents 175, cirrhosis of liver 159, nephritis 144, heart diseases 139, cerebral hemorrhage and softening 139, cancer 130.

In 1936, the Metropolitan Life Insurance Company⁴² found that the chief cause of all deaths between 20 and 44 years of age was tuberculosis.

A study of Ohio vital statistics⁴³ showed that in *mechanical and manufacturing industries*, in 1929, the *tuberculosis* death rate for *females* was 118.1 versus 96.6 for males and that, in 1930, the tuberculosis death rate of female workers was nearly six times that of males.

Brundage⁴⁴ points out that clerks have a lower rate of mortality than the proprietors, managers, and officials who employ them. Both in England and the United States the death rate of ministers and preachers is almost as low as that of agricultural workers. Again, economic status is really a minor factor since, for example, the concept of affluence is not associated with the status of the average farmer who, of all persons, has the longest life. 'In Scotland, fishermen, shepherds, gardeners, and foresters are extraordinarily free from disease and especially when compared with the morbidity experience of coal-miners of Scotland.' 'It appears, also, that, in the United States, good health and long life are not dependent to any very important extent upon climate, but, from mortality data, upon conditions of life, such as celibacy, mode of living, and occupational exposures incident to our industrial civilization.'

The question is: Do agricultural, pastoral, and even clerical and mental pursuits provide biological necessities for health, longevity, and accomplishment? At least it appears that health and longevity are only indirectly, if at all, dependent upon affluence, station, education, or work, except where work involves an artificial mode of living or hazardous working conditions, or both.

In closing, I am much inclined to the idea that, in general, a low state of health of the industrial population is closely associated with prolonged states of industrial unrest, and that if it is hazardous to human lives to produce an article of human usefulness, then the cost of production must include the cost of health protection. Industry should not be a source of disease, but a source of health and happiness.

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Reprinted from
June, 1937

Industrial Medicine

Reg. U. S. Pat. Off.

844 Rush Street
Chicago

SUBJECT - Report of Division of Industrial Hygiene, State of
Illinois

MEMORANDUM TO DR. T. R. CROWDER:

With reference to previous correspondence, subject matter, and Dr. Kronenberg's report dated April 1, 1938 recommending the use of Martindale respirators for employees in the sorting room at the Chicago Laundry:

A test in the use of respirators was made at the Chicago Laundry in the sorting room and washroom for a 30-day period as a further study to determine whether the potential hazards from dusts should be controlled thru the use of respirators. While Dr. Kronenberg did not recommend their use for washroom employees, it was felt the potential hazard was equally as great in this department, as the washroom employees are required to place the linen in the washers from the soiled linen hoppers which extend to the sorting room.

We are attaching for your information memorandum from Laundry Manager Fitzgerald outlining the test in detail and are also forwarding under separate cover a number of envelopes properly identified containing the filter pads which were removed from the respirators each day during the test.

Provided the use of respirators was adopted at our Chicago Laundry, we would eventually be obliged to extend the practice to our other plants which would result in a total expense of approximately \$640.00 per year.

In view of this test, we would appreciate your further recommendations regarding the use of respirators in our own laundries.

A handwritten signature in dark ink, appearing to read "M. H. H.", with a long horizontal flourish extending to the right.

EK-B
CHICAGO - April 11, 1939

October 31st, 1938.

#3.

TO ALL REPAIR SHOPS:

Dear Sir:

The Industrial Hygiene survey of Calumet Shops revealed the need for a proper exhaust ventilating hood over picker in Mattress Room to remove dust from the hair as it enters the picker.

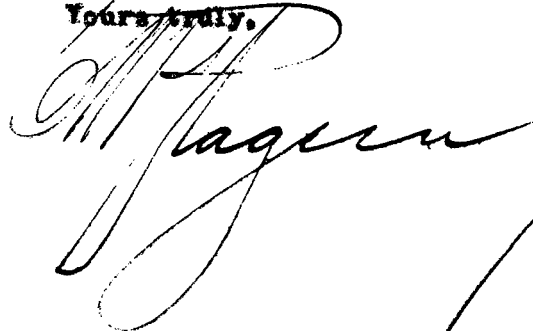
The hood as applied at Calumet Shops is connected to the suction piping of the fan, as shown on drawing C.S.A-2386, copy attached hereto.

You should make application of this hood as shown, and in addition, make weekly inspections of the exhaust fan, fan drive, piping and dust collector to make sure that the fan is operating at the required speed to exhaust the dust from the picker and storage bins. Proper record is to be maintained covering these inspections.

Piping and collector must be maintained in dust tight condition to provide the proper air supply at the picker and bin.

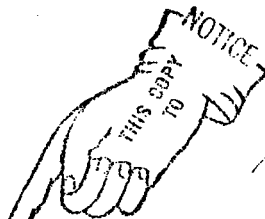
Please advise when these instructions have been complied with.

Yours truly,



JVL/hf
Enc.

cc- Dr. T. R. Crowder
Mr. Harry Guilbert



CHICAGO - October 27th, 1938.

MEMORANDUM to Mr. Champ Carry;

Referring to your memorandum of October 11th in connection with Dr. Kronenberg's industrial hygiene survey of Calumet Shop and report submitted to you covering this survey with our memorandum of August 24th, and AFE submitted to you with our memorandum of October 1st:

In reference to item 1, page 6: The reason for Pullman Car Works' inability to maintain a constant oil pressure is on account of the distance the oil has to be transported thru a non-circulating system. This oil is handled for approximately 4000 ft. from the storage point to the outlet. During cold weather the oil congeals, causing a sluggish condition which affects flow and pressure. Pullman engineers understand the difficulty involved and have done everything possible to overcome the problem, to the extent of purchasing higher grade oils in winter time at an increase in price. It is an engineering problem, and we do not feel that the present system can be remodeled to work satisfactorily, and the only way to overcome the trouble complained of is by the installation of an oil storage system at Calumet Shop, where the distance the oil has to be transported will be short, it can be kept under proper pressure and the supply heated when necessary to permit of the proper flow at outlets, and we think that this item should be considered at this time.

In reference to item 5, page 2: The use of respirators for laborers sweeping out cars is not recommended as with proper sprinkling of floors which are to be swept (known as the wet method) the dust condition is controlled and with such a condition we do not think that it is necessary to restrict an employee by the use of a respirator, or have the expense of furnishing them, as we do not consider the exposure is hazardous under our method.

Item 7, page 3: The use of respirators by employees mixing asbestos cement was started on August 1st, 1938.

Item 10, page 3: It has been definitely determined by actual working conditions that the combined use of goggles and approved type respirators restricts operator's vision so as to make a definite safety hazard. The dust from this operation is mostly metal. It does not reach the operator's breathing zone, and the Committee who studied the job is of the opinion that there is no hazard, and agree that respirators should not be worn by the bandsaw operator.

Item 15, page 4: We are using improved methods and nozzles which permit the proper blowing of underframes and equipment under cars, and do the work in a satisfactory manner. We do not feel that cement pits are necessary nor desirable, as they are hard to keep clean and offer a very definite hazard as men may fall in them when they are not covered up by cars, and we see no need for them and do not recommend their installation because of the additional hazard involved, they will not permit of any better handling of the work or give better protection to the employees, and the cost.

Item 16, page 5: We have insisted that the manufacturers furnish asbestos cement to the repair shops in paper bags and they have agreed to do this, and the Purchasing Agent will purchase asbestos cement only in such containers.

Item 3, page 8: Our experiments with the ventilating hood and exhaust system in connection with the stripping of mattresses, etc., have proved that the arrangement as recommended and covered by AFE papers will be entirely satisfactory.

Memo. Mr. Champ Carry,

Oct. 27th, 1938.

Page 11 -- We will keep you informed as to developments of leadfree materials, and will state here that the Engineer of Tests is going into this matter very thoroughly to eliminate the hazard.

Item 2, page 17: The installation of spray booths in the Varnish Room at Calumet is typical of installations thruout the country made by the DeVilbiss Company. A check up with the engineers of that concern as to installations made by them in plants of Ford, Chrysler, General Motors, railroad shops and manufacturing plants (where the same type of equipment as we have is being used) shows that none of them are equipped with forced ventilation and it is not required. Every test made of the air flow at the face of the booths revealed a greater air supply than required, and this is the point to be considered. The changes proposed are unnecessary and this conclusion was reached after going into the matter very thoroughly with the DeVilbiss engineers. Would also state further, that if we use a forced draft over the work being handled in these booths we would not get a satisfactory job.

Items 1 and 2, page 19: Regular cleaning periods have been set up, and a weekly check of the air flow is made, to guarantee proper operation of dye booth.

Item 1, page 20: Air movements are necessary on the machines in the Wood Machine Department to remove the dust and wood debris away from them. Any failure of the removal system would be noticed immediately by the operator of the machine or the foreman of the department, and the system is maintained in order to have an efficient operating condition. Under such conditions we do not feel that velocity readings would add anything to the system, as what might be considered necessary velocity would not remove the dust and chips from the machine, and proper removal of such dust and chips indicates satisfactory operation.

Item 2, page 21: The operator on a small spray booth in a lacquer room, which is designed so that the operator cannot enter into the booth, is not exposed to the off spray. His work requires him to leave the front of the booth frequently in handling trays of trimmings to and from the booth. An airline mask under these conditions, with hose trailing around, would not work out satisfactorily and the hose hanging around (so as to give freedom of movement to the operator) would in our opinion constitute a tripping hazard to other employees going thru this room and to the operator. There are no open dipping tanks in this room and men are not exposed to fumes released from any solvents in dipping tanks, and we feel that they have proper protection and there is no health hazard. These men use a respirator which is of the approved type for this work and provides necessary protection.

Item 4, page 22: The inspection and checking of respiratory protection equipment is made by the shop safety supervisor, reporting direct to Mr. Harry Guilbert. With the installation of a room centrally located for handling and dispensing respiratory equipment, the employees in this department will be under the direct supervision of the Safety Department. All equipment is to be changed regularly and record kept, to insure the exchange for sterilization purposes at proper stated intervals. This is also in connection with item 5, page 22, and items 6, 7 and 8 on page 23.

Items 1, 2 and 3, page 25: The plating room is not of the latest modern type. It represents the average type found in use in the majority of plants in the state. The employees in this department receive monthly examinations by Dr. DeMotte, and each employe has many years of service in the work and their records do not indicate any serious illness attributable to the employment. With these conditions and

Memo. Mr. Champ Carry.

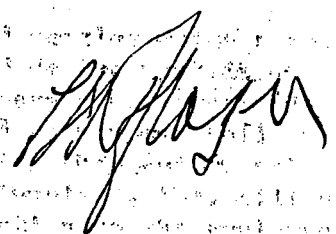
the fact that we have not had occupational diseases in this department, I feel that the alterations can be deferred until next year as it would be desirable to make such changes during the summer season.

Items 1 and 2, page 31: The proper ventilation of toilet rooms is possible with the opening of windows and ventilators now provided, and under our present method we feel that this is satisfactory and meets all reasonable requirements. Forced ventilation would be controllable by supervision, as it would be manually operated and if not properly operated would not eliminate the cause of complaint. Therefore, the installation of any forced ventilating system is not recommended.

Item 3, pages 31, 32 and 33: The intent of the law is not clear and until we know more about what is required to comply with the law, I am still of the opinion that we should wait and see what the developments are when the inspector first visits our shop.

In reference to the item of Dust, page 35: Evidently what Dr. Kronenberg had in mind was the setting up of a permanent industrial hygiene program under the Medical Department, in a central laboratory (supposedly in the dispensary at Pullman), properly equipped and manned by assistants and laboratory technicians working in conjunction with representatives of the Engineering, Safety and Chemical Departments, to make field surveys and studies of all Pullman properties, collecting samples of dust, gases and fumes, etc., to which our employees are exposed, taking of blood samples from all men in contact with materials liable to cause occupational disease, making necessary analysis of same, and in general, their periodical surveys to develop the fact as to whether or not any of the materials being used, or dust, gas or fumes, are endangering the health of the employees and are liable to result in occupational diseases, and to advise corrective measures. The setting up of such a system would have to take in the repair shop employees and also any other employees in the yards and districts, subject to occupational disease hazards.

The approval of the AFE in amount of \$9500.00 is recommended, and also that preliminary work in connection with the Plating room in the Brass Department be gone ahead with, with the intention of making these changes next summer.



CHICAGO -- October 27th, 1938
w/hf

BC -- Dr. T. R. Crowder

Chicago, October 11, 1938

Mr. C. W. Pflager:

Referring to your memorandum of August 24th, submitting your analysis of the Kronenberg Industrial Hygiene Survey at Calumet Shops, also your memorandum of October 1st submitting A.F.E. covering certain of the recommendations for improvements made in the course of the Kronenberg survey:

Dealing first with your memorandum and A.F.E. of October 1st: - I am returning the A.F.E. asking that the third item, that is, "Purchase and install fuel oil storage and pumping system, to replace present pipe line to Pullman-Standard Car Manufacturing plant" be deleted.

It seems to me that before we make any expenditure such as you recommend that the unsatisfactory service performed by Pullman Car Works in furnishing us fuel oil through a pipe line should be brought to their attention in writing with request that they advise what they can do to improve this faulty condition. We can give this particular question further consideration when we have reply from the Manufacturing people.

With this item omitted I will recommend approval of the revised A.F.E. to Mr. Crawford.

Dealing with the balance of the Kronenberg report and your analysis and recommendations in connection therewith. I note that you have put into effect or there already was in effect a very substantial number of the Kronenberg recommendations and I will, therefore, make no comment on these items. I have already signified my willingness to recommend carrying out recommendations included in your A.F.E. with the exception above noted. There are, however, several features of the report that I wish to comment on, as follows:

Item 5, Page 2 - Your non-concurrence is not fully stated. You apparently reject the recommendation for the use of respirators on the basis that wet methods of sweeping are in use. The recommendation was not on the basis of either respirators or wet sweeping methods but contemplated both. I would like a fuller statement of your reasons for rejecting this recommendation.

Item 7, Page 3 - You say that you concur in the recommendation but do not indicate whether you have put the recommendation into effect and I would appreciate advice on this point.

Item 10, Page 3 - I wish Mr. Guilbert would study the safety hazard that the report states would be involved by the use of respirators by band saw operators in the Tin Department and report on that feature.

Item 15, Page 4 - I assume that we are using the improved methods and equipment mentioned as eliminating the need for the pits recommended.

Item 16, Page 5 - It is not quite clear from the wording of your recommendation whether you propose to carry out the report's recommendation or not. V/C

Item 3, Page 8 -- I await with interest the results of your experimentation with ventilating hood and exhaust system for use in connection with the stripping of mattresses.

Comments on use of lead paints - Page 11 - I would like to be furnished with periodical advice as to our ability to secure lead-free materials that could be substituted for materials presently in use.

Item 2, Page 17 - I am not particularly interested whether sufficient fresh air is taken into the spray rooms by keeping the doors, ventilators and windows open but it is essential and necessary that sufficient fresh air be supplied. I am not entirely impressed by your statement of how this air is presently being supplied. If some sort of force ventilators are necessary they should be installed and I wish you would consider this item further with advice.

Items 1 and 2, Page 19 - Your recommendation seems satisfactory but also indicates that at the time of the Kronenberg survey the fan and exhaust duct were not in satisfactory condition. This indicates the absolute necessity of regular checks and reports on this condition.

Item 1, Page 20 - I feel that the regular velocity readings recommended by Kronenberg would do no harm and might do a lot of good.

Item 2, Page 21 - My non-concurrence in having the operators on small spray booths ~~not~~ wear airline masks based on greater cost, hampering men at work or just what is the reason.

Item 4, Page 22 - Who conducts the frequent inspections referred to and to whom are the results of these inspections reported?

Item 5, Page 22 - This item is included in the A.F.E. which I have stated I would approve, however, I would like to suggest that this central dispensary be under the supervision of the Safety Department who would have direct responsibility for proper maintenance and inspection of equipment. 10/1/41

I think that Items 6, 7 and 8 on Page 23 all form a part of proper supervision of respiratory equipment by some central source with full responsibility, such as the Safety Department.

As regards Items 1, 2 and 3, Page 25 - I note that this \$9,500. expenditure was not included in your A.F.E. What is your present state of mind on these items?

Items 1 and 2, Page 31 - It seems to me that something more positive than supervision is needed to insure proper ventilation. I should think that the installation of some sort of force ventilator would be the solution.

Item 3, Pages 31, 32 and 33 - I concur in your recommendation that we wait and see what developments are made along this line.

Referring to your general comments on "Dust" on Page 35 - I do not get the full significance of the Kronenberg recommendation and would like a fuller statement on this point.

Item 1, Page 36 - I would suggest that Dr. Crowder discuss this with the Pullman-Standard people and see if we cannot work out some sort of a joint arrangement.

Item 2, Page 37 - I concur in your recommendation.

I also concur in your recommendation under "Solvents" on Page 37.


Champ Carry

CC-Messrs: Dr. T. R. Crowder ✓
H. Guilbert

Chicago, October 10, 1938.

Mr. F.S. Rick:

Referring to your memorandum of June 25rd in connection with that part of the Kronenberg Industrial Hygiene Survey as it affected your Department:

I note that you reject the suggested use of respirators in the soiled linen room. Such use could do no harm and might do some good, and I would be interested in knowing what you estimate the cost of carrying out the Kronenberg suggestion would be.

As regards your comments on a scrap shed,-- it would appear to me that the indicated thing to do, regardless of existing conditions, would be to prepare recommendation on what work should be done and an estimate of the cost. It does not seem to me that the picture or the analysis is complete without these figures, even though we may not be in a position to do anything about it at the present time.

You say in your comments on the paint stock room that warm water, brushes, and soap are available at all times, but you do not say that any effort is made to see that they are used. I certainly think that that part of the Kronenberg recommendation requiring hand washing, etc., could and should be carried out.

I am not entirely impressed by your arguments for the canvas glove as against the rubber glove and think that unless a more convincing argument can be made we should follow the Kronenberg recommendation.

Chas. C. C. C.

cc - Mr. C. W. Pflager,
Dr. T. R. Crowder,
Mr. Harry Guilbert.

Chicago, October 10, 1938.

Mr. F. R. Callahan:

Referring to your memorandum of June 5rd in connection with that part of the Kronenberg Industrial Hygiene Survey that affected your Department:

I note your first recommendation for expenditure of \$60.00 to provide exhaust ventilation in the welding booth and I concur in this recommendation. I also concur in your second recommendation for application of exhaust ventilating system at an expenditure of about \$5.00.

My only other comments are in connection with non-concurrence in the report recommendations for the use of approved respirators and positive pressure helmets. You say that these would be impractical for yard use but do not point out why and I would be interested in an explanation of that feature.

Chas. Barry

cc - Dr. T. R. Crowder ✓
Mr. Harry Guilbert

Desk #3.

MEMORANDUM to Mr. W. T. Stewart:

With reference to your memorandum of the 29th ult., file Cont. 310, stating that Asbestos Cement can be obtained in 50-lb. dust-proof paper bags, at an increase of \$1.00 per ton, or a net price of \$27.00 per ton:

As the present cloth bags permit the dispersion of asbestos dust during handling, which is objectionable from a hygiene standpoint, it is desired that in the future all asbestos cement be furnished to the Repair Shops in the 50-lb. dustproof paper bags, and would thank you to arrange accordingly.

Carl Hagen

CHICAGO - October 4th, 1938
JWL/hf

cc- Mr. F. S. Rick
Mr. C. Cartelman
Mr. A. O. Killinger
Mr. John Cannon
Mr. F. H. Geiger
Mr. J. H. Dietrich
Mr. J. Darragh
Mr. Harry Guilbert
Dr. T. R. Crowder

-- COPY --

PULLMAN - Aug. 23rd, 1938.

MR. C. W. FLAGLER:

I have read over the completed report with recommendations for changes at Calumet Shops, given me yesterday by Mr. Limbrock. I approve of all recommendations made. I think both Dr. Kronenberg and the committee have done a very good piece of work.

(sgd) R. J. DeMotte,
M.D.

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THE PULLMAN COMPANY
BUREAU OF SAFETY AND COMPENSATION

Chicago - August 22nd, 1938.

MR. C. W. Pflager:

OCCUPATIONAL DISEASE SURVEY.

Dear Mr. Pflager,

As you know, I was not present at the last meeting at which the above report was discussed, but I have read the Committee's findings and am in accord with them. Mr. Limbrock is to be congratulated on a good job, particularly in view of its tedious nature.

This morning I discussed some of the items with Mr. Limbrock, particularly Dr. DeMotte's remarks in regard to an industrial technician. It seems to me that before adopting the Doctor's recommendations, we should give some consideration to the Pullman Car Works' report and the situation at the other shops. In other words, in the final analysis it appears that there will be sufficient work for a technician on Dr. DeMotte's payroll.

Sincerely,

(sgd) Harry Guilbert

CHICAGO - August 24th, 1933.
Desk #1.

MEMORANDUM to Mr. Champ Carry:

With reference to our memorandum of June 28th regarding Calumet Shops' Industrial Hygiene Survey report made by Dr. M. H. Kronenberg and his associates:

Upon completion of our studies of the report, survey of the Shops, and several conferences between the Medical, Safety, and this department, we have been able to prepare a joint report which includes the above three departments' conclusions and recommendations, specifically agreed to at a meeting held in this office on August 13th, attended by Drs. Crowder and DeHette, Mr. Lewis of the Safety Department, Messrs. Williams, Limbrook, Gartelman and me.

It is the consensus of opinion that Dr. Kronenberg has done a good job and written a fine report on his survey. On the whole it should result in improvement of health conditions in the Shop. In making his recommendations, he has in mind the ideal set-up for the control of unhealthful conditions and they are unquestionably good, a number of which we concur in and have placed into effect at nominal costs and have so stated in our report.

In a number of cases where we have found practices which were considered by Dr. Kronenberg to incur potential health hazards, although his analyses of the dust, fumes, etc., according to his survey, proved to be well within the safe limits prescribed for health control of employees, we were able to make substitutions of the materials used or complete elimination so as to remove all question of doubt.

A number of the recommendations concurred in by all will require purchase and installation of equipment, facilities, and building changes, at an estimated cost of \$47,800.00, increasing the net annual operating expense \$6855.00, which includes \$3500.00 allowance for added personnel in the Pullman Dispensary, room attendants for washrooms, and the maintenance of personnel respiratory protective equipment, balance of which is increased cost of power, maintenance, outside laboratory fees, as listed in the attached summary of investment and annual operating expense statement.

Referring to sheets 39 and 40 of the attached report:

In regard to item of \$9500.00 for Brass Finish Department: The rearrangement should be made, but considering conditions it is recommended that this be deferred for the present and until conditions improve.

In reference to item of \$29,000.00 for new Wash Room: Our interpretation of the law calls for such an expenditure, in order to comply with same. However, Section 3 "Illinois Wash House Law" reads:

"It shall be the duty of the State and county mine inspectors, factory inspectors and other inspectors required to inspect places and kinds of business required by this act to be provided with washrooms, to inspect such wash rooms and report to the owner or operator, the sanitary and physical condition thereof in writing, and make recommendations as to such improvements or changes as may appear to be necessary for compliance with the provisions of this act. Any inspector shall have the authority to lock and close any wash room found to be conducted in violation of this Act, and may institute proceedings to enforce the penalty provided in Section 4."

Memo. Mr. Champ Carry,

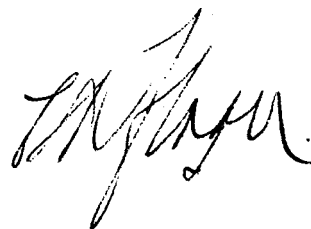
It is our recommendation that no action be taken at this time, and that action be deferred until we have a visit from factory inspectors and they make a request for complying with the law and definite recommendations as to what must be done to comply with same.

The other expenditures are recommended.

The Medical Department reports that during the 25 years of medical service at Calumet Shops by Dr. R. J. DeMotte, we have had a certain amount of trouble with occupational diseases but during that time, we have had no lost time of any employe due to purely occupational disease. Years ago we transferred a few men who were doing lead burning, prior to the time an efficient exhaust system was installed. We transferred two or three men from varnish removing jobs. There is no recollection of transferring anyone in the Paint Department account signs or symptoms of lead poisoning. Years ago we had certain amount of dermatitis due to paint solvents, chiefly turpentine. Improvements in materials and methods of handling in the latter years have eliminated this trouble.

On the whole, working conditions at Calumet Shops are above the average for Shops doing this type of work. The adoption of all of the recommendations will not eliminate claims for occupational diseases. We will, however, be in a better position to make a proper defense of unfair claims before the Industrial Commission if the recommended practices are placed in effect.

The expenditures involved cover Calumet Shops, and with the tendency of Occupational Disease laws spreading to other states in which our plants are located we contemplate making occupational disease surveys at the other shops, submitting our recommendations for consideration.

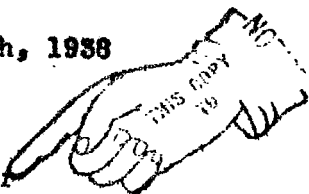


CHICAGO - August 24th, 1938

JWL/hf

Enc.

cc- Dr. T. R. Crowder
Mr. Harry Guilbert
Dr. R. J. DeMotte
Mr. C. Gartelman



Calumet Shops

DUST

(Pages 4 to 12, inclusive)

STALL SHOP

Page 9, Item 1.

REPORT RECOMMENDATION

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.

Item 1.

OUR RECOMMENDATION

All stripping operations of cars are now performed outside the buildings, as far as is possible from a standpoint of weather conditions and handling in proper sequence. On operations required to be done in the Shop Building, the dust conditions are of slight and intermittent duration. However, as the dust counts Table III, Stall Shop, reveal a high concentration for a moment, we concur in the recommendation for a moment, ployas doing this work wear approved type of respirators, which plan is now in effect. The cleaning and maintenance of respirators are covered later under the heading of "Respirators".

Item 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.

Item 2.

We concur in this recommendation and this plan is now in effect. In addition, we have assigned the stripping operations to a comparatively few men so as to localize and provide ease of control over these operations. This dust condition is also intermittent and of short duration.

Item 3.

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

Item 3.

The use of water when stripping pipe covering has been tried and found to be impractical as the insulation cannot be thoroughly soaked to remove the dust condition within a reasonable time period to enable work to be completed in proper sequence.

REPORT RECOMMENDATION

Item 3, Cont'd.

OUR RECOMMENDATION

Item 3, Cont'd.

The soaking of the insulation would require drying operations to restore pipe covering efficiency and would set up another potential dust hazard.

Respirator protection as outlined in Item 2, previous page, furnishes an adequate solution of the problem.

Item 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.

Item 4.

Recommendation to install mechanical exhaust on the grinder in the Tin Department and all grinding wheels in the entire Shop is concurred in, although the use of these machines is of intermittent operation and they are located in well ventilated buildings. It is conceded that the mechanical exhaust application will improve shop conditions. Estimated cost to install \$2500.00, annual operating cost, \$175.00.

Item 5.

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

Item 5.

We do not concur in the recommendation to have men sweeping out cars daily, wear approved type of respirators as the practice of applying wet methods while sweeping has been used for years, although it is used with caution due to its resulting in slipping hazards. This also applies to Item 9, Page 10, with regard to sweeping shop floors.

Item 6.

Several roof ventilators of the rotary type be installed.

Item 6.

We do not concur in this recommendation due to the fact that the ventilators will not remove the dust from the interior and underneath the cars without creating severe drafts and, as these periods of dust liberation are intermittent and of extremely short duration, and which dusts are immediately cleared with natural draft ventilation now employed, no changes are recommended. The use of respirator protection as previously stated, in Item 1, removes all potential hazards.

STALL SHOP (CONT'D)

REPORT RECOMMENDATION

Item 7.

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

Item 8.

That the operation of removing tank covers be conducted outside the Stall Shop.

OUR RECOMMENDATION

Item 7.

We concur in this recommendation to have the one man wear an approved type respirator while mixing asbestos cement which is approximately 1/2 hour per day. We have improved the method of handling the mixing with water to minimize this dust.

Item 8.

We do not concur in this recommendation as it is impossible to determine in advance and while the car is outside the building, which casing requires removal. The testing operation must follow certain operations that must be performed within the Stall Shop and it is after these operations that it is determined whether or not the casing is to be removed. Under the reported recommendation, it would be necessary to remove every tank casing or pull the car out of Shop, whereas we are required to remove a relatively small percentage of the total. As the dust condition is momentary and immediately liberated from buildings through natural draft ventilation, we feel that the use of approved respirators is not required by the few men doing this work.

Item 9.

Covered in Item 5.

Item 10.

We do not concur in this recommendation as this operation is of a delicate nature and the wearing of the respirator would provide a definite safety hazard. The very slight dust, mostly metal, is not considered a potential health hazard.

Page 10, Item 9.

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

Item 10.

That the band saw operators in the Tin Department wear an approved type respirator.

STALL SHOP (CONT'D)

REPORT RECOMMENDATION

Page 10, Item 11.

That the removal of iron tanks, boxes, etc., now done by the Underneath men of the Body Department, be conducted on the outside.

Item 12.

That the floor men of the Body Department wear approved respirators for dusty operations.

Item 13.

That the roof men in the Body Department wear approved respirators when removing insulation.

Item 14.

That Joiners and Helpers wear approved respirators when working at dusty operations.

Item 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.

OUR RECOMMENDATION

Item 11.

We do not concur in this recommendation for the same reasons previously stated under Item 8, Tank Casings.

These operations are gradually being eliminated due to the fewer cars requiring initial application of air conditioning systems. Therefore, no change is recommended.

Item 12.

We concur in this recommendation and this practice is now in effect.

Item 13.

We do not concur in this recommendation due to the increased safety hazards through their use on this job. The operation studied by Dr. Kronsberg has been practically eliminated as fewer cars require the alteration to roof dusts of air conditioned cars. This operation will no longer be required within a short period of time.

Item 14.

This item was covered in General Stripping Operations, Page 9, Item 1, which practice is now in effect.

Item 15.

We do not concur in this recommendation. Improvements in methods of blowing and use of improved type nozzles eliminate the need for two pits at a cost of \$2,000.00 and their heavy maintenance costs.

REPORT RECOMMENDATION

Page 10, Item 16.

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

OUR RECOMMENDATION

Item 16.

We concur in this recommendation although the cost will increase approximately \$76.00 per year at Calumet Shops and \$250.00 for all Shops. The Purchasing Agent has been advised accordingly.

BRASS DEPARTMENT

Page 10, Item 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.

Item 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.

Page 6, Item 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.

Item 1.

The polishing of brass and door treads has been transferred from the Polishing Department to the car on the outside of buildings, eliminating the change suggested in the Polishing Wheel exhaust hood.

Item 2.

This practice has been placed in effect to maintain the high degree of efficiency found during the survey.

Item 1.

While the dust control system in the Sandblast Room was found to be well designed and presented no silicosis problem if present conditions are maintained, we find it difficult to maintain the old style dust arrester screens which are over 11 years old. It requires the removal of the roof of the casing to make repairs, resulting in considerable delay and loss of service so it is recommended that we replace the old dust screens with the latest type developed by the Sly Company to provide proper conditions at all times. This change will cost approximately \$1200.00 and is recommended. Reduced maintenance will absorb the expenditure in approximately 5 years.

REPORT RECOMMENDATION

Page 10, Item 1.

That several roof ventilators of the rotary type be installed.

OUR RECOMMENDATION

Item 1.

We do not concur in this recommendation. The reason for this recommendation is based on the fact that during the survey in January, this year, some smoke was noticed escaping from the oil forges in the Blacksmith Shop. At this period, the hoods over forges of the mechanical exhaust system were in raised, or work position, which permitted a slight liberation of smoke into the building which would have been exhausted through the continuous saw tooth roof ventilating sash had they been open. This practice has been corrected.

The cause of the smoke liberation from the forges was due to the inability of Pullman Car Works to maintain a constant pressure during the cold weather on the fuel oil which they furnish to us through a pipe line, which arrangement has been in effect for many years. The fluctuation in oil pressure caused a fluttering flame, affecting the combustion.

Owing to the difficulty experienced, we feel that a fuel oil storage system should be installed at Calumet Shops, thus eliminating the need of supply from the Car Works. Such an arrangement would effect an annual saving of approximately \$400.00 per year by eliminating line loss and sales tax. We would then be able to purchase lower grades of oil and the smoke difficulty would be removed at its source. The cost of an oil storage system would be approximately \$2400.00, which improvement is recommended.

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WOOD SHOP

Page 10, Item 1.

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

Item 1.

The present practice of inspecting the wood mill-shavings and dust exhaust system semi-monthly in winter and monthly in summer, at which time the department is thoroughly blown to promote good housekeeping and reduce fire hazards, has been in

WOOD SHOP

REPORT RECOMMENDATION

Page 10, Item 1, Cont'd.

OUR RECOMMENDATION

Item 1, Cont'd.

effect for 11 years and is considered a proper practice, with no need for change. In fact, the high efficiency of the system, according to the survey, reflects the soundness of this practice. No change is recommended.

Item 1.

We concur in this recommendation to provide a space partitioned off within the Cabinet Shop to provide improved disc sanding operations. The cost of this work is included in our cost summary at \$250.00. The operator has been wearing a respirator at all times during the operations although it has been changed to an approved type.

Item 1.

The hood on the mattress picker has been redesigned for improved operations.

Item 2.

The exhaust system of the hair picker and bin has been speeded up to obtain the increased velocity at the points of dust generation recommended, although the dust concentration was well within the safe prescribed limits.

Item 3.

We do not concur in the recommendation to have all mattress workers wear respirators. We do recommend, and have adopted, the use of an approved Bureau of

CABINET SHOP

Page 11, Item 1.

That the portable disc grinder now being used in the small storeroom 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

Page 11, Item 1.

That the hood over the feeding table to the picker be lowered as far as possible without interfering with the feeding operation.

Item 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.

Item 3.

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

MATRESS ROOM (CONT'D)

REPORT RECOMMENDATION

Page 11, Item 3, Cont'd.

OUR RECOMMENDATION

Item 3, Cont'd.

Mines type respirator for the operators on the hair picking and stripping operations which are the points of dust generation. All other operators are not exposed.

We are experimenting with a ventilating hood and exhaust system for use in connection with the stripping of mattresses so as to eliminate the dust at the source of generation, which, if proven successful, will cost approximately \$185.00, at an annual operating cost of \$75.00.

FEATHER ROOM

Page 11, Item 1.

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

Item 2.

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

Item 3.

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

Page 11, Item 1.

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

Item 1. & 2.

Prior to the Krumenber survey, A.F.B. was approved, and project completed since the survey, to change the location of the Feather Department and replace the obsolete equipment with modern facilities.

This Department, with one operator wearing an approved type respirator, is entirely satisfactory with no further changes recommended.

Item 3.

Improved housekeeping is now possible due to modern facilities and will be maintained in this manner.

Item 1.

All men about sandblasting operations have been faithfully wearing the positive pressure air masks and hoods as per existing instructions. However,

YARD

REPORT RECOMMENDATION

Page 11, Item 1, Cont'd.

OUR RECOMMENDATION

Item 1, Cont'd.

we have had difficulty with the larity of the Helpers working around the sandblast shed and those wheeling sand not wearing respirators issued to them by the Safety Department. Upon investigation, it was found that the respirators furnished were not of the approved types. This was corrected with the result that the new types provide a greater breathing capacity which is more comfortable, thereby creating a desire on the part of the employees to wear them. The Safety Department has set up a plan of control in the selection of types, frequent checkings as to constant use, and maintenance.

Item 2.

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

Item 2.

The carpet cleaner is equipped, and faithfully wears a Devilbiss Positive Pressure air mask, the same as paint spray operators.

The point raised in this regard by Dr. Kronenberg, Page 7, Item 2, was that there was a question as to providing sufficient air pressure within the mask to offset a direct wind blowing into the facial discharge.

This mask has been tested repeatedly over a period of months under the most severe conditions and we find that the operator has complete protection at all times.

The mask was developed by the Devilbiss Co. for this type of service as well as paint spraying and they are considered by health authorities and industrial hygiene experts as one of the leading manufacturers of approved protective equipment.

The suggestion to change the design is not based on fact. Therefore, we will continue with the use of the masks as they are now constructed.

REPORT RECOMMENDATION

Page 11, Item 3.

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

Page 12, Item 4.

That a new building be erected to replace the present salvage hut. That the scrap material pile and screens be vetted to prevent the liberation of dust.

Item 5.

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

OUR RECOMMENDATION

Item 3.

We do not concur in this recommendation with the exception of the Leader in charge of this work, which plan is now in effect. All others are in this vicinity for a few moments at a time and, therefore, are not exposed sufficiently to produce occupational disease hazards.

Item 4.

Mr. Rick has covered the Salvage Hut in his report dated June 25, 1938. Proper quarters are considered necessary to provide required facilities. With regard to the window screen item, we have changed our practice of dry brushing to a wet tank cleaning, thereby removing the dust condition from the source.

Item 5.

We do not concur in this recommendation as this change would not eliminate the need for shoveling, still required in the unloading of cars. There would be no labor reduction under this plan and the cost to install the system would be approximately \$2,000.00. We feel that inasmuch as we are using washed sand, that the dust problem is slight and that the use of approved type respirators by those engaged in this work offers the necessary protection. However, when new equipment has been developed, we will consider for future recommendations.

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LEAD

(Pages 13 to 20, inclusive)

REPORT COMMENTS ON USE OF LEAD PAINTS

We appreciate the fact that some lead is essential in good quality paints but we doubt that more than 3 per cent is required in the pigment. There are on the market today several lead-free paints in which lead has been replaced by zinc oxide, titanium oxide, and lithopone. However, if purchasing lead-free paints, care should be taken that they are obtained from reputable manufacturers. It has been the experience of this Division to find supposedly lead-free paints in industry that contain as high as 12 per cent lead.

It is also highly desirable that lead compounds be eliminated from plant operations, for compensation boards are more interested in whether or not lead is used and not particularly the percentage in the product. It is unwise and costly for management to sit back and assume an attitude that since less than 3 per cent of lead is found in paints, a case of lead poisoning cannot occur. The fact remains that cases of lead poisoning have been known to exist. Whether or not the compensation awards were justified is another question. What we desire to point out are the actualities in the compensation cost to management for lead poisoning.

STALL SHOP

REPORT RECOMMENDATIONS

Page 18, Item 1.

That the engineering department delegate an engineer for research and design of an exhausted blow torch and flexible exhaust system to prevent the liberation of lead fumes from burning operations deleterious to health.

OUR COMMENTS ON USE OF LEAD PAINTS

We have been reducing the lead content in paint materials, also, substituting lead-free pigments in a number of cases for cars and shop building maintenance. More recently we abandoned the use of Inside White Primer, L-140, and substituted L-227, having a trace of lead.

The only purpose in retaining lead pigments is to obtain a reasonable service life of finishes. As new lead-free materials are developed by reputable manufacturers and proven for service by our testing bureau, we will continue to adopt them. For the present, the adoption and use of approved respiratory protection equipment and the recommendations made in the medical section of this report will provide the necessary control over this situation.

OUR RECOMMENDATIONS

Item 1.

The design of combination blow or cutting torch and exhauster as recommended in the report has been studied and we find that it is impractical as all cutting is based on controlled heat at the cutting tip, which is completely nullified by the attempted exhaustion of fumes as they develop above the cutting tip. The system as proposed would require a network of piping and fans throughout the Stall Shop to pro-

REPORT RECOMMENDATIONS

Page 18, Item 1, Cont'd.

OUR RECOMMENDATIONS

Item 1, Cont'd.

vide sufficient outlets. It is estimated that the cost would be approximately \$7,000.00. The few burning operations inside the Shop are of intermittent and short duration, performed in a large, well ventilated building. The balance is performed out of doors.

The blood tests of all Burners by Dr. Kronenberg for possible lead exposures, Table VI, proved negative. It is our recommendation, and we have placed this plan in effect, to have Burners wear approved respirators for lead which will provide the required protection. Recommendations in the medical section of this report will provide further control in this regard.

Item 2.

That all scrapers and sanders of painted surfaces wear respirators approved for lead dust.

Item 2.

To concur in the recommendation to have all Sanders wear respirators approved for lead dusts, on painted surfaces only. This plan has been placed in effect. Tests on scraping operations did not reveal potential lead dust hazard. Further, the heavy physical labor required may, in our opinion, affect other physical disturbances. Therefore, we do not recommend respirators for this work.

Page 19, Item 3.

That the use of some other material besides lead be used for bending pipe in the Tin Department. Any wax may fulfill the same purpose.

Item 3.

We have adopted the use of fittings instead of bending drain pipes in the Tin Department so as to enable us to abandon the use of open lead pot which produced lead fumes as shown on page 16, Table V. These fumes contained lead within the maximum safe concentration. However, we eliminated the fumes at their source to provide maximum safe conditions.

REPORT RECOMMENDATIONS

Page 19, Item 4.

The tinning tank to be relocated, placing it along the building wall and that mechanical exhaust ventilation of the lateral type be designed and installed for this tank. Unless constant operations require this tank in its present size, it is recommended that it be redesigned to as small a surface area as is practical.

Item 5.

That the temperature of the molten lead be kept as low as production operations will allow. The use of a gas and air blast on the surface of the metal be prohibited as it tends to disperse the dross into the air of the workroom.

Item 6.

As little paint mixing be done by the paint stockroom as is possible.

Item 7.

That the men in the Paint Stock Room be required to wear rubber gloves and also that they be ordered to wash and brush their hands and nails, at noon and at the end of the day, with soap and warm water.

OUR RECOMMENDATIONS

Item 4. & 5.

This exposure in the Fln Department, while within the maximum safe concentration limits, has been eliminated as the work of tinning bottom plates of ice boxes of air conditioned cars is no longer required. The tinning tank has been scrapped.

Item 6.

The mixing of paint in the Paint Stock Room has been reduced to an absolute minimum.

Item 7.

We concur in Mr. Rick's reply of June 23, 1938, to the recommendation with regard to Paint Stock Room; i.e., relative the present practice of using rubber gloves in washing paint cups and brushes and for other purposes when found necessary. Canvas gloves are generally used for handling and issuing material. These men also use a special hand lotion, Catg. M-1645, furnished by us, which is made from specifications provided by the Engineer of Tests, which use has afforded satisfactory protection.

These employees are also furnished hand brushes to clean their hands and nails at noon and at quitting time. Warm water and soap is available for use at

REPORT RECOMMENDATION

Page 19, Item 7, Cont'd.

Item 3.

Eating food in the Paint Stock Room be prohibited at all times.

Item 9.

That all men using lead paint be required to wear gloves and to wash their hands thoroughly twice daily.

Page 19, Item 1.

That the application of white lead for press fits be done otherwise than by smearing it on with bare hands. The use of lightweight rubber gloves and a brush for applying lead should be put into use.

Item 2.

All men handling lead be required to wash their hands and to brush under their nails, at noon and at the end of the work day, with soap and warm water.

OUR RECOMMENDATION

Item 7, Cont'd.

all times and we urge the men to make use of these facilities.

Item 8.

Eating in the Paint Stock Room is strictly prohibited at any time. Signs have been posted to this effect, which practice has been in operation for years. This room is locked during the noon hour so as to prevent entrance during this period. No change is therefore recommended.

Item 9.

It is impractical for Painters to wear gloves in any form, due to heat and perspiration and the nature of their work. The men use a special hand lotion, Catg. M-1645, prepared for this purpose by our laboratory which provides the required protection.

WHEEL and AXLE

Item 1.

We do not find that the Wheel Press Operators apply white lead on wheels and axles with their bare hands as reported. The operators have been secretly checked a great number of times and we have always found them using the brushes provided for this purpose. We did find a small amount of white lead on their hands, obtained in handling the axle. These men cannot wear rubber gloves as suggested due to the hazard of rolling wheels.

Item 2.

These men have been instructed to, and do, wash their hands before eating and before leaving the plant.

BATTERY HOUSE

REPORT RECOMMENDATION

Page 19, Item 1.

All battery men handling lead materials be required to wear rubber gloves and to wash their hands thoroughly at noon and at the end of the day with soap and warm water.

Page 20, Item 2.

All lead burning operations be conducted in or in front of a mechanical exhausted hood where the velocity at the point of burning be of sufficient magnitude to prevent the escape of lead fumes into the work room.

Item 3.

Approved respirators be worn by men assigned to the scrapping of lead battery plates and cases done by the yard gang.

METAL FUMES

(Pages 21 to 23, inclusive)

STALL SHOP

Page 23, Item 1.

That the recommendations for research on an exhausted blow torch and flexible exhaust system presented under the section on "Lead", be applied to all gas welding, burning, and cutting operations.

OUR RECOMMENDATION

Item 1.

All Battery men have been faithfully wearing gloves for years. They are under the constant eye of an alert supervisor who is particularly careful of the cleanliness of his department and men. The practice of washing hands at noon and at the end of the day is also one of long standing and under rigid control.

Item 2.

All lead burning operations of approximately 2 hours per week have been conducted for years in front of mechanically exhausted hood which is checked monthly to maintain the required air flow so as to prevent escape of the fumes into the work room, which meets the recommendations.

Item 3.

This plan has been placed in effect.

Item 1.

The combination blow (cutting) torch and exhauster, suggested in the report under section on "Lead", has been found to be impractical. We are testing a portable exhauster, developed by the Lincoln Electric Co. that appears to meet some of the requirements. This device, in combination with the use of approved type respirators and recommendations included in the Medical section of this report, will adequately meet the requirements at a cost of \$225.00 and an annual expense of \$150.00.

TRUCK SHOP

REPORT RECOMMENDATION

Page 23, Item 1.

That a flexible exhaust system for welding and cutting operations be studied for the Truck Shop as outlined for the Stall Shop.

OUR RECOMMENDATION

Item 1.

We are experimenting with a pneumatic tool in the Truck Shop for the purpose of removing nuts, bolts, etc., which, if successful, will reduce the burning operation at least 50 per cent, and will be recommended, at a cost of \$275.00, and an annual operating cost of \$100.00.

BRASS DEPARTMENT

Page 23, Item 1.

That a local exhaust hood be designed for the brazing bench or an exhausted torch be used.

Item 1.

Brazing work in this department is limited to intermittent operation, not exceeding 2 hours per day. However, we concur in the recommendation to install a local exhaust hood over the brazing bench. The cost is estimated at \$310.00, and an annual operating expense of \$60.00.

Item 2.

The welding of bunk rods, now being performed in the aisle way between the Brass Department and Equipment Room, should be given a more suitable location with adequate local exhaust ventilation or an exhausted torch.

Item 2.

We do not concur in the recommendation to change the location of the bunk welding operation. This location is in proper sequence to other operations. We do concur in the installation of local exhaust ventilation by means of the Lincoln exhaust, at a cost of \$95.00 and an annual operating expense of \$75.00.

BLACKSMITH DEPARTMENT

Page 23, Item 1.

That booths be built for the welders, somewhat similar to the paint spray booths with sufficient velocity at the point of welding to draw fumes away from the welders into the exhaust system.

Item 1.

Ventilated booths for welding operations are impractical due to the varied nature of the work which would not permit welding in permanent booths. These booths are expensive to install and operate. We recommend the installation of 3 Lincoln exhausters, designed for the purpose and placed in the market a

BLACKSMITH DEPARTMENT (CONT'D)

REPORT RECOMMENDATION

Page 23, Item 1, Cont'd.

OUR RECOMMENDATION

Item 1, Cont'd.

few months ago, at a cost of \$310.00, and an annual operating expense of \$210.00. While the welding is carried on in a well ventilated building and is not considered a hazard, we believe the use of the exhausters will provide maximum safety.

LOCAL EXHAUST VENTILATION

(Pages 24 to 29, inclusive)

SPRAY BOOTHS

Page 28, Item 1.

Care should be exercised in utilizing the same booth to prevent one spraying where two men are working toward the other.

Item 1.

This statement was brought about when the Spray Operator did not exercise care in spraying in the booth before the two helpers engaged in handling materials to and from the booth had been permitted to leave the booth.

The cycle of operation set up a few years ago is such that the two booth helpers must be away from the booth before spraying starts. This is a matter of supervision, which has been reviewed again with the man in charge so that this condition will not be repeated.

Item 2.

Doors, ventilators, and windows should be kept open in spray rooms, thus insuring an adequate air supply and preventing the setting up of a negative pressure in the room which will prevent the fan from operating at capacity.

This recommendation is not considered good practice nor necessary. Tests made and recorded in the survey revealed proper air flow to booths in winter, without the doors, ventilators, etc., open.

The nature of the building housing spray booths is such that the opening and closing of doors for handling materials to and from the building, together with the leakage at windows, doors, etc., provides sufficient air for all operations without drafts and without effect on the room temperature, permitting

SPRAY BOOTHS (CONT'D)

REPORT RECOMMENDATION

Page 28, Item 2, Cont'd.

OUR RECOMMENDATION

Item 2, Cont'd.

quality finish, free from dust and dirt. No change is therefore considered.

Item 3.

Monthly inspection should be made on all Spray Booths. This inspection should include checking of face velocities and removing any accumulation of material on fan blades. This accumulation affects the operating characteristics by increasing the blade friction - decreasing the fan's capacity.

Item 4.

Men should be instructed to place material in the booth, as close to the exhaust opening as possible, and rotating tables should be installed.

Item 5.

Materials too large to be set entirely into a booth should be sprayed on one end and then turned around and sprayed on the other end, thus precluding the spraying of objects outside the booths. If many of these conditions exist, special Spray Booths of sufficient size should be built.

Pages 28 & 29, Item 1.

The booth for spraying seat covers should be enclosed with the grill area above the spraying plane. The Edison Company's illuminating

Item 3.

Monthly inspections of all spray booths for face air velocity, as recommended in this report, has been our practice for some time. In addition, weekly, instead of monthly, examinations of fan, motor, belts, and spray booth interior for accumulation of materials therein, is the practice in effect to provide maximum efficiency and to guard against fire hazards.

Item 4.

This arrangement has been in effect for some years on a large portion of the work. However, there are some jobs upon which this cannot be done. Close observation on these few jobs reveals proper air movement and the use of Devilbiss air pressure hoods, recently adopted, eliminates any possible health hazard. No change is therefore considered.

Item 5.

The spraying of a few objects too large to be set entirely into the booth should be turned end for end and we have placed this practice into effect. This arrangement eliminates any need for a special Spray Booth as suggested.

Item 1. & 2.

We do not concur in the recommendation to make the changes suggested, to the Dye Spray Booth. Considerable research by Devilbiss and Pullman

DYE ROOM

REPORT RECOMMENDATION

Pages 28 & 29, Item 1, Cont'd.

engineers should be called in for design of adequate artificial illumination to allow color matching.

Item 2.

The velocity on the spraying table of this booth should be increased to approximately 200 feet per minute.

OUR RECOMMENDATION

Items 1 & 2, Cont'd.

engineers at the time spray dyeing was developed by the Mechanical Department, including the construction of several types of booths, including the type suggested in the survey, i.e., to enclose the top similar to the conventional paint spray booths, that of having the exhaust above the table top and to use artificial light for matching colors. These principles were abandoned as they were found to be incorrect as daylight matching of colors was found to be the starting point.

The suggestion to have a face velocity of 200 feet per minute is the same as required for paint spray booths and was found impractical when handling dyes of lighter specific gravity. This air flow was so great that it was impossible to apply the dye to the upholstery.

It was found that with the exhaust grille below the spray table and a velocity at the table of 150 feet per minute, the dye could be applied in proper manner and with the downdraft system, the spray vapors would be drawn away without reaching the breathing zone of the operator.

The booth, as installed, fully meets all health and underwriter's requirements of all the states. The low velocities obtained by Dr. Kronenberg were taken before the fan and exhaust duct had been cleaned. After cleaning, the velocities were brought up to standard.

We have adopted the practice of cleaning the booth monthly in summer and semi-monthly in winter, which practice will guarantee efficient operation.

Before adopting the spray method of dye application at each Shop, the hand brush method was used which required several men to apply with frequent cases of illness whereas with the spray method, one operator takes care of the same work in a half day without a case of illness reported in two years.

Requests to the Devilbiss Co. from Industrial Hygiene engineers, State Labor and Health authorities for

DYE ROOM (CONT'D)

REPORT RECOMMENDATION

Pages 28 & 29, Items 1 & 2, Cont'd.

OUR RECOMMENDATION

Items 1 & 2, Cont'd.

Information as to costs, methods, etc. are increasing so that recommendations can be made to industry to eliminate health hazards attendant to hand brush or dip methods now employed. No change is therefore considered.

Item 3.

The sprayer should be cautioned to always spray directly toward the exhaust grille and never against the sides of the booth.

Item 3.

We have corrected the condition reported.

HOOD SHOP

Page 29, Item 1.

Velocity readings should be taken monthly at various locations at the hoods and in the ducts to check the efficiency of this system. Ducts should be inspected for settling of conveyed material and cleaned frequently.

Item 1.

We do not concur in the recommendation as it has been our practice to blow the machines and ducts when the plant is not working, semi-monthly in winter and monthly in summer, which guards against settling of conveyed material in ducts.

In addition, the nature of the machine operations require proper air movement at all times to remove the saw dust and wood debris. To meet production requirements, therefore, the system must be maintained in a highly efficient condition at all times. We feel our practices are entirely satisfactory which was reflected in the high efficiency of the system found during and after the survey. Therefore, no change is recommended.

BRASS DEPARTMENT

Page 29, Item 1.

A well designed mechanical exhaust be installed on the dryer.

Item 1.

Tests with air dry lacquers have enabled us to abandon the use of the dryer.

REPORT RECOMMENDATION

Page 29, Item 2. ✓

The open circular seam in the exhaust duct from the polishing wheel be properly repaired.

OUR RECOMMENDATION

Item 2.

The open circular seam in the exhaust duct was promptly repaired and practice of monthly inspection of ducts, fan belts, and taking air velocities in ducts has been placed in effect. Readings taken at the time the report was made revealed proper air velocities at hoods so that the slight opening did not affect the efficiency of the system.

Item 3.

Exhaust fan be installed for the exhaust hoods on the Oakite tanks.

Item 3.

With regard to installing exhaust hoods over Oakite tanks: Our recommendations are incorporated in general ventilation of the Plating Room, see page 25 of this report.

PERSONAL RESPIRATORY PROTECTION

(Pages 30 to 33, inclusive)

Page 32, Item 1.

That no mechanical filter respirator be purchased or used unless it has the seal approval of the U.S. Bureau of Mines for the particular dust encountered.

Item 1.

We concur in this recommendation. This matter is handled by the Safety Department and replacements of respirators (not approved) will be made as rapidly as is practical.

Item 2. ✓

That all booth sprayers wear airline masks with detachable hoses.

Item 2.

We concur in this recommendation in part, that of having spray booth operators on large booths, when they enter the booth for spraying operation, wear airline masks and which plan is now in effect. However, we do not concur in having the operators on small spray booths in the Lacquer Room, Dye Room, and Varnish Room wear them as the operator is not exposed to the off-spray. An approved type respirator is used and it provides the required protection.

PERSONAL RESPIRATORY PROTECTION (CONT'D)

REPORT RECOMMENDATION

Page 32, Item 3.

That pressure helmets be checked to ascertain if at least six cubic feet of air per minute are being supplied and that the control valves be adjusted to at least this capacity.

Item 4.

That pressure helmets for car paint sprayers of the design shown in Figure VIII, be tried. If the glass piece is kept clean when in operation, they should supplant those in use as replacements are necessary.

Item 4.

The changes suggested in the report, Figure VIII, on Devilbiss pressure helmets, i.e., the application of glass face piece and perforated baffles, is considered impractical from an engineering and safety standpoint. The helmet as designed for this type of work has been generally accepted and it affords 100 per cent protection to the operator from paint spray fumes. Since receiving the report, we have checked the efficiency many times and have found only one case where the operator did not have full protection and that was due to his carelessness in application. We have found that frequent rigid inspections at stated periods will guarantee proper protection, which regulation is now in effect.

Item 5.

That a room be built in the Stall Shop for issuing and maintaining respirators, air masks, and pressure helmets, with a competent person in charge. It shall be the responsibility of this individual to supply respirators, both clean and sanitary, each morning to occupations requiring them.

OUR RECOMMENDATION

Item 3.

We have placed this practice into effect.

Item 5.

We concur in the recommendation to provide a room centrally located in the Shop with the necessary equipment, in charge of a trained attendant to issue, clean, test, repair all respirators, air pressure masks, and hoods, and goggles as well. We do not have the proper facilities nor satisfactory method of taking care of this equipment due primarily to the lack of a properly equipped room and competent person in charge.

The value of these protection devices is approximately \$4,000.00 and it is felt that a well equipped and manned department would effect savings to this equipment, sufficient to absorb a large portion of the operating costs.

PERSONAL RESPIRATORY PROTECTION (CONT'D)

REPORT RECOMMENDATION

Page 32, Item 5, Cont'd.

OUR RECOMMENDATION

Item 5, Cont'd.

The cost of setting up this plan is \$1200.00, which includes the cost of a duplicate set of respirators to enable the operator to maintain the equipment during regular working hours. Many large firms have adopted this arrangement and approval is urgently recommended.

Item 6.

That each foreman should return all respirators used in his department at the end of each day to the room attendant above recommended.

Item 6.

This plan is not recommended as it is important to know that each man is wearing the proper type equipment which can be properly handled by the room attendant. The use of a duplicate set of respirators would permit a quick exchange without loss of time.

Item 7.

That all respiratory protective equipment be cleaned daily and sterilized before issuing it to another worker.

Item 7.

The cleaning and sterilizing of respirator equipment would not be required daily due to the exposures involved. We believe a weekly change of most of this equipment is sufficient and the plan of furnishing each employe with a respirator or mask for his own exclusive use will effect greater sanitary protection than the plan proposed.

Pages 32 & 33, Item 8.

That the recommendations herein made governing the use of respiratory equipment be strictly adhered to and enforced with the same intensity as the present regulations for the wearing of goggles.

Item 8.

This recommendation is concurred in. This feature is under the jurisdiction of the Safety Department and they have placed regulatory practices into effect. Continual research and development by leading manufacturers of respiratory equipment is producing devices affording greater protection, comfort, and practicability to the wearer. Therefore, continual contact with these developments is advisable so that equipment is maintained on a high standard basis.

BENZOL - (VARNISH REMOVER)

(Pages 34 to 37, inclusive)

REPORT RECOMMENDATION

Page 37, Item 1.

That a building be erected to house the varnish removing operations which should be reasonably insulated for summer use to provide a comfortable and healthful environment.

Item 2.

An efficient ventilating system should be provided eliminating the vapors at their source before they reach the workers' breathing zone. This is best done by providing table and tanks with lateral exhausts. Figure IX illustrates how such an arrangement might be made. The exhaust fan and motor should, of course, be of the non-sparking and explosion proof type. Further, the exhaust line should be provided with flash back arrester as an additional safeguard against fire.

Item 3.

That varnish removers wear airline masks with detachable hoses with air supplied from without the building.

Item 4.

That periodic samples of air should be taken for benzol to check the efficiency of the exhaust ventilation.

OUR RECOMMENDATION

Items 1 to 4, inclusive.

We have abandoned the use of benzol, having found other methods to perform the work which will eliminate the potential toxic health problem and fire hazards as well. The new building, ventilating system, and other recommendations of the report are therefore not required.

PLATING ROOM

REPORT RECOMMENDATION

Page 41, Item 1. ✓

It is obvious that the plating room arrangement and practices in the Calumet Shops require attention from a health viewpoint. In general, the program to follow is:

- a. Acid tanks and operations should be separated as far as possible from cyanide tanks and operations.
- b. Processes which produce acid fumes and vapors should have local exhaust systems of the lateral type.
- c. Water rinsing tanks should be conveniently located close to acid and plating tanks to minimize dripping of solutions on the floor.
- d. All tanks should be raised above the floor on gratings to facilitate flushing floor at regular intervals, as well as to allow examining tanks for possible leaks.

Item 2.

That the bright dipping operations be arranged to allow rinsing as well as bright dipping directly in front of the exhaust hood.

Item 3.

Detailed recommendations as to the rearrangement of present equipment or installation of new equipment can only be done after a more comprehensive study of the material flow and working schedules. This would require as much time as was spent on our entire study. However, we do recommend, since the

OUR RECOMMENDATION

Items 1, 2, & 3.

Present plating room arrangement and equipment is of the average type found in use by the majority of Industrial Plating plants today. All employees of this department are examined monthly by Dr. Delotte and most of them have had many years of service in this work without serious illness caused by job environment.

Since the advent of Occupational Disease laws in several states, practically all of the new Plating Departments are designed with a view toward improved conditions through ventilation and arrangements to reduce the possibility of air pollution.

We have made a thorough study of this department in connection with authorities on the subject and it is our recommendation to rearrange the department, install local mechanical exhaust ventilation to Acid, Cyanide, and Oakite cleaning and plating tanks which, we feel, will remove any question as to health control in this department. The cost of making these improvements is estimated at \$9800.00, with an annual increased operating cost of approximately \$1500.00.

PLATING ROOM (CONT'D)

REPORT RECOMMENDATION

Page 42, Item 3, Cont'd.

Plating Room foreman appeared very capable and anxious to eliminate health hazards, that his advice be sought for rearranging and installing equipment to conform to our general recommendations in order that the efficient operation of the plating room may not be hindered.

GLASS DEPARTMENT

Page 42, Item 1.

That the mirror stripping table be provided with lateral local exhaust ventilation similar to our recommendations, under our section on Benzol, covering the varnish removing operation. The air flow of this system should be of sufficient intensity to remove the fumes at their source with sufficient degree to keep the working environment free from concentrations of nitrous fumes, deleterious to health.

Item 2.

That mirror strippers wear tight fitting goggles to protect the eyes from acid or alkali burns instead of the present style of goggles.

Page 42, Item 1.

That a suitable tank with lateral mechanical exhaust ventilation be installed for the dust cleaning operation of adequate design to effectively remove the oxalic acid vapor and gases emanating from this process. However, it would be preferable to find a

OUR RECOMMENDATION

Items 1, 2, & 3, Cont'd.

Item 1.

The use of nitric acid for stripping silver from mirrors has been, until recently, a standard, universal practice in all Glass plants. Our investigation revealed the fact that we could substitute the use of muriatic acid, 25 per cent solution, for the 100 per cent nitric method with the result that the potential health hazard would be greatly reduced. It is now possible to handle the muriatic fumes with local exhaust ventilation, which was practically impossible with the old method, the cost of which is estimated at \$350.00, and an annual operating expense of \$25.00. This improvement is recommended.

Item 2.

This recommendation has been adopted.

Item 1.

The cleaning of "Y" connections of air conditioned cars had been changed January 13, 1938, to eliminate oxalic acid by substituting Oakite, an inhibited alkaline material affording maximum health conditions. The equipment suggested in the report is, therefore,

STALL SHOP (CONT'D)

REPORT RECOMMENDATION

Page 42, Item 1, Cont'd.

substitute for oxalic acid. The use of Calite should be investigated.

OUR RECOMMENDATION

Item 1, Cont'd.

unnecessary.

ARSENIC

(Pages 43 to 45, inclusive)

PLATING ROOM

Page 45, Item 1.

Serious consideration should be given to the possibility of abandoning the practice of arsenic plating for a different method. It is our belief that because of the progress in the art of plating, a substitute method could be found achieving similar or perhaps better results.

Item 1.

The use of arsenic (150 lbs. per year average) is required to produce the steel strike (black) finish #4 for exterior and vestibule trimmings.

Recognizing the potential health hazard through its use, experiments in different types of finishes are being conducted by Foreman Lundberg of the Brass Department and it can be said that within a short time we can abandon the use of arsenic entirely.

ORGANIC SOLVENTS - THINNERS - DISINFECTANTS

(Pages 46 to 48, inclusive)

Page 47, Item 1.

That an effort be made to find substitutes for denatured alcohol, turpentine, toluol, and carbon tetrachloride, provided these substitutes can produce like results.

Item 1.

With reference to the use of organic solvents, the following quantities were used, per day, in 1937, which controlled use presents no potential health hazards.

L-1 Alcohol, denatured - 15 gallons used in mixing upholstery dyes, shellac, leather dressings, and paints. No substitute is known as of this writing.

L-3, Stoddard Dry Cleaning Solvent, 58 gallons used chiefly for dry cleaning upholstery materials in laundry, cleaning seats, backs, sofas, aisle and wall end pads, headrests; also, for

REPORT RECOMMENDATION

Page 47, Item 1, Cont'd.

OUR RECOMMENDATION

Item 1, Cont'd.

cleaning air brake valve and air conditioning
compressor, speed control
material is considered the
a standpoint of health and
L-128, Nephtha, 22 gallons - is
L-3 replaces this solvent
health and safety conditions
L-192, Turpentine, 17 gallons used
materials. To date we know of no substitute
for turpentine.

L-145, Varnish Remover (Benzol-Toluol) - 10 gallons.
Will no longer be used as other, safer methods
have been adopted.

L-269, Lacquer Thinner, 11 gallons used for lacquer
thinning. Required to provide proper mixing
of lacquers so as to obtain maximum service
life. No substitute is known at this time.

C-713, Carbon tetrachloride, 7-1/4 gallons, per year,
used for Shop fire extinguishers as required by
Fire Underwriters. No change can be made in
this solvent. We do not permit the use of this
material for any other Shop purpose. When sub-
stitutes are developed which will satisfactorily
meet requirements, we will consider them.

The Paint Stock Room, where some of these solvents are
used for paint work, is large with a high ceiling and
has sufficient skylight and windows to provide proper
ventilation to guard against contamination of the at-
mosphere.

Item 2.

Lacquers and enamel thinners are used under rigid
control and only where absolutely necessary.

Item 3.

It will not be necessary to enlarge the Lacquer Spray

That all lacquer and enamel thinners containing
benzol be used under rigid control measures
and their constant use limited.

Item 3.

That the Spray Room in the Brass Department should

REPORT RECOMMENDATION

Page 47, Item 3, Cont'd.

be made larger with the dip tank enclosed as completely as possible with the addition of a local mechanical exhaust system.

Item 3, Cont'd.

Room in the Brass Department as we have always met the heaviest production requirements with ease. With regard to providing local mechanical exhaust ventilation and completely enclosing the lacquer dip tank, we have been able to direct this work to the Spray Booths so that this tank will be removed from service with considerable improvement in safety against fire and the lacquer fume problem without the expense and operating cost of the ventilation system and the enclosure proposed.

Item 4.

That cans of organic solvents used throughout the plant be of the safety can type to prevent excessive evaporation of these solvents.

Item 4.

It has been our practice to use Underwriters' approved safety type containers for organic solvents to prevent excessive evaporation of these solvents in all departments except the Upholstery Cleaning Department. The type can in use in this department was developed by us, none being available on the market. This can has spring hinges to close when not in use and it affords ample protection. However, we are experimenting with a new type safety can, approved by the Underwriters, with a view toward adoption, the cost of which would be nominal.

Item 5.

That men be prohibited from washing hands in organic solvents, unless a hand soap will not remove the dirt and grease. Under such conditions, Stoddard solvent (L-3) may be used, but it should be immediately followed by a hand soap and warm water.

Item 5.

Men have been prohibited from washing hands in organic solvents except L-3 where grease and dirt is difficult to remove with hard soap.

Page 48, Item 6.

That the sprayers in the Brass Department should wear airline masks.

Item 6.

We do not concur in the recommendation for the Spray Booth operator in the Brass Department to wear airline masks.

REPORT RECOMMENDATION

Page 48, Item 6, Cont'd.

OUR RECOMMENDATION

Item 6, Cont'd.

These men do not enter the Booth and are not exposed to the off-spray. Further, since abandoning the lacquer dip tank, we have removed the possible flow of lacquer fumes from this tank enveloping the operator while standing in front of the Booth. The nature of the work requires the Spray Operators to handle the work to various parts of the Room. Therefore, the airline to masks would be continually in the operator's way.

These operators have been equipped with approved type respirators which provide the necessary protection under the new arrangement.

ILLUMINATION

(Pages 49 & 50)

Page 50.

We are not going into any detail recommendations as the problem is one of designing a system for the entire Calumet Shops. This would necessitate a much more detailed study than we conducted and furthermore, such studies are available at no cost through the Edison Company and illumination equipment manufacturers. However, we do recommend that such studies be made as soon as possible and that proper artificial illumination be installed as soon as economic conditions will allow. But, in determining when business conditions will warrant expenditures for illumination, the returns of such an investment from decreased spoilage, fewer accidents, and greater productivity should not be overlooked.

The lighting system at Calumet Shops was revamped at the time the Shops were rebuilt, in 1927. At that time Mr. Cohn engaged capable illumination engineers and contractors to make changes and additions to the system which, upon completion, was considered to meet recommended standards of that time.

Since then opinions with regard to standards of lighting have changed considerably with the result that the intensity figures have been raised and a number of the old style fixtures are now considered obsolete by some engineers.

After a number of checks of the lighting conditions at the Shops, we consider them fair. We have some isolated cases of deficiency which will be corrected. The study of the lighting system will be continued and our recommendations will be submitted upon completion.

SANITATION

(Pages 51 to 53, inclusive)

REPORT RECOMMENDATION

Page 52, Item 1. ✓

That all toilet rooms be adequately illuminated, ventilated, and heated.

Item 2. ✓

That toilet rooms be painted a lighter color and that they be cleaned daily.

Item 3. ✓

That adequate clean washing, shower, and locker facilities be made available to all employees. Also, that all washing and shower facilities have a supply of hot and cold water, towels, and soap. That a building be erected to have lockers, separate rooms for eating, showers, and washing facilities.

OUR RECOMMENDATION

We do not completely agree with the findings as described in the report on Page 51 for the following reasons:

Items 1 & 2.

The Men's toilet rooms are properly heated and ventilated to meet city health requirements. The walls and ceilings are painted once a year which is more frequent than is regular practice in industrial plants. White and light gray colors have been the standard for years as suggested to be adopted. The toilet rooms are cleaned each day, floors are washed, toilets and urinals are scrubbed and disinfectant applied weekly.

As the survey was made in winter, the odorous condition reported was due to lack of opening windows. This condition has been corrected by proper supervision.

Item 3.

The report is in error with regard to "no washing, locker, or shower facilities being available except for a few men, designated as safety men, despite the fact that all men are employed in dirty occupations". To clear up this misunderstanding we list the following Wash-Locker and Shower Rooms which are separated from Work Rooms, maintained in a well ventilated and sanitary condition:

	<u>Lockers Washstds. Showers Fountains</u>			
Safety (Painters)				
Washroom (Sdbstrs.)	140	36	4	1
(Brass)				
(Glass)				
Cabt. & Mill	108	16	-	-
Uphol. & Brass	127	8	-	-
Truck-Machine, Blk-anth. & Trim	137	12	-	-

SANITATION (CONT'D)

REPORT RECOMMENDATION

Page 52, Item 3, Cont'd.

OUR RECOMMENDATION

Item 3, Cont'd.

	<u>Lockers</u>			<u>Washstds.</u>			<u>Showers</u>			<u>Fountains</u>			<u>Drinking</u>		
Power, Light & Mch'y.	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Electric & Battery	65	4	2	2	2	2	2	2	2	2	2	2	2	2	2
Stall Shop	370	12	- 6 unit -	-	-	-	-	-	-	-	-	-	-	-	-

(For use of Car Builders, Joiners, Tin, Platform, Steamfitters, Electricians, Laborers, and Stores)

All offices are amply supplied with lockers and washstands. In addition, sufficient number of drinking fountains, dispensing properly cooled water in summer are located within easy reach of all departments.

We have always considered these facilities proper and adequate for the average number of employees working. However, since the advent of the amended Illinois Washroom laws as of July, 1937, requiring "Sufficient" number of showers and adequate drinking fountains, based on a maximum number of 1500 employees, we do not have sufficient showers, washstands, and lockers. Further, the new law requires a minimum of 7 square feet per locker which necessitates the removal of lockers from a third of the Wash and Locker Rooms, thus reducing these facilities to such an extent as to require the erection of a new building, size 3500 square feet, to house approximately 450 lockers, 80 washstands, 18 showers, and 2 drinking fountains and, in addition, the change of washstands and addition of others to most of present washrooms due primarily to the seven square feet per locker ruling.

It is apparent that these changes and additions will be required to meet the State requirements and the recommendations incorporated in Dr. Krenenberg's report at an estimated cost of \$29,000.00 and an increased annual operating cost of approximately \$2,000.00, although we believe that present facilities meet the needs of the employees as a great number of men drive their cars or are within walking distance of the Shop and will not take the time to use showers before leaving for home. A test check of the Safety

REPORT RECOMMENDATION

Page 52, Item 3, Cont'd.

OUR RECOMMENDATION

Item 3, Cont'd.

Washroom proved that one man used one of the showers once a week out of 100 men using the Washroom. It appears that it will be necessary to change life-long habits to have them benefit through the use of the proposed additions to Washroom facilities as required by law. It is our recommendation that no action be taken at this time, and that action be deferred until we have a visit from factory inspectors and they make a request for complying with the law and definite recommendations as to what must be done to comply with same.

Item 4.

That all men be prohibited from eating in work rooms where hazardous materials are employed.

Item 4.

The statement that food is eaten in work rooms is a fact.

The statement that no lunch room is provided for the men and that the Lunch Room is used chiefly by office and administrative employees, also the statement that Shop workers feel they are too dirty to come to this room, are absolutely without basis.

In the first place, we have a modern, sanitary cafeteria with sufficient space to accommodate the ratio of employees who are able to purchase a tasty and healthful, balanced meal for 25 cents or any portion thereof, as low as 5 cents, to those who go home or bring their lunches from home.

This cafeteria was installed primarily for the Shop men. A good test of the Cafeteria's need is on a stormy noon hour when it is loaded to capacity, mostly with men in work clothes.

We have made a thorough personal contact with the men in a survey of the eating problem in our own plants and several other plants, including Railroad Shops and we find the same results, the men like to get away from the Shop to break up the day, or, they are within walking or driving distance of home, or they bring their lunches and select some quiet place in the Shop buildings or in the Yards, outside the gates,

REPORT RECOMMENDATION

Page 52, Item 4, Cont'd.

OUR RECOMMENDATION

Item 4, Cont'd.

mostly away from their particular work location. In a great number of cases, the supervisors of the plants, including Calumet, are still carrying their lunches due mainly to the habit formed when they were apprentices, helpers, mechanics, and so on. It is another case of trying to change the life-long habits and desires of men, which cannot be done. We have invited the men, through letters posted on the bulletin boards and through their supervisors, to make use of the Lunch Room whether they have their lunches with them or to enjoy the varied selections available. Test counts before and after reveal no change and yet a sufficient number of the workmen and other employees use these facilities, making them indispensable. We also have a private Lunch Room for the seamstresses in the Upholstery Department away from their work. We permit smoking in the Cafeteria and in the Blacksmith Shop during noon hour only so as to control the hazard from this source. We see no health hazard in the present practices as we do not permit employees to eat in departments or rooms where hazardous materials are employed.

Item 5.

That a rule be made and enforced requiring all men to wash before eating and at the end of the day, and that a program of educating the men to use showers at the end of the day be carried out.

Item 6.

That vacuum cleaning of premises and workrooms be instituted insofar as possible. If this is not permissible, wet method should be used.

Item 5.

With regard to the men washing before eating and at the end of the day: A large proportion of the men do this as a matter of course and we urge our men to make use of the washing facilities.

Item 6.

Due to the nature of the Shop Buildings and equipment, it is impractical to vacuum clean the plant as thoroughly as can be accomplished by frequent blowing when the plant is not working, followed through by wet method sweeping to complete the job. Present method is entirely satisfactory and the house-

SANITATION (CONT'D)

REPORT RECOMMENDATION

Page 52, Item 6, Cont'd.

OUR RECOMMENDATION

Item 6, Cont'd.

keeping and general working conditions at Calumet Shops are equal to the best, barring none, as we have, in the course of our investigations, been privileged to visit many Shops in this and other states.

MEDICAL SECTION

JUST

Page 2, Paragraph 2.

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.

This is an excellent suggestion and would require increased space, equipment, and personnel, the cost of which would be approximately \$10,000.00, with an added annual operating expense of \$7,000.00. We would like to have a well equipped and manned hygienic laboratory at the Pullman dispensary. However, we doubt very much whether the results obtained would anywhere near offset or equalize the costs of the facilities and service installed. We believe this is a matter for the Management to decide. Our medical department is not equipped to make analyses of toxic substances, including dust, gases, and fumes in minute quantities, which are handled in the investigation of health hazards. Such facilities are included in the hygienic laboratory mentioned above. As it is not necessary to make continual analyses once a definite practice is established, we recommend that this work be sent to outside laboratories for the present, the annual cost of which is estimated at \$800.00.

Page 12, Item 1.

That semi-annual physical examinations and chest

Item 1.

Our present policy conforms with this recommendation

DUST (CONT'D)

REPORT RECOMMENDATION

Page 12, Item 1, Cont'd.

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.

Item 2.

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

OUR RECOMMENDATION

Item 1, Cont'd.

We even go further than this in that we have a rotating system of service in our sandblasting. A man works 3 months in and 3 months out of this job, with examination and x-ray of the chest every 6 months. It has also been our policy to allow the men to work a total of one year only in this occupation. This is a matter of policy due to recent silicosis racket which has swept the country.

Item 2.

If all respiratory diseases in our Shops are investigated thoroughly to determine the source, there would be required additional personnel cost, since individual environment outside the Shop would need investigation. These men spend less than one-fourth their time in the Shop. It is reasonable to believe that many factors other than working conditions enter into the causation of respiratory diseases. On the other hand, it would be simple to study the grouping of respiratory diseases each year to see if certain departments or occupations contribute an undue percentage of cases in this list of claims. If such departments or groups are found, investigation of conditions in the Shop can be made without much trouble or expense. We recommend this latter course.

LEAD

Page 20, Item 1.

That all men in contact with lead materials be given quarterly blood examinations which shall show an estimate of the percentage of reticulocytes and the number of stippled cells.

Item 1.

This suggestion embodies the proper procedure for obtaining fairly accurate knowledge of the absorption of lead by workers exposed and we recommend that this be done. It could be done in one of two ways. We have a local, dependable clinical laboratory at the Roseland Community Hospital which will do this work for us at about \$1.00 per man per examination. The

REPORT RECOMMENDATION

Page 20, Item 1, Cont'd.

OUR RECOMMENDATION

Item 1, Cont'd.

number of men exposed to the hazard of lead in Calumet Shops would probably vary from one to two hundred during fluctuations of employment, at an estimated annual cost of \$1000.00; or, we could employ a laboratory technician at the Dispensary at a cost of about \$1500.00 per year.

Of the two methods we would recommend the addition of a laboratory technician to the dispensary staff which would enable them to take care of Pullman-Standard Car & Mfg. Co.'s occupational disease work, in addition to Calumet Shops' requirements if desired.

Item 2.

No person shall be employed in an occupation involving the use of lead in any form unless his physical fitness to engage in the duties for which he is employed has been determined by a physical examination which shall include a blood examination showing the percentage of reticulocytes and the number of stippled cells.

Item 3.

An employee exhibiting symptoms of industrial lead absorption or intoxication shall not be allowed to resume work involving a lead exposure unless his fitness to resume such work has been determined and studied by the medical department and shall consist of physical and laboratory examinations and tests.

Page 48, Item 1.

That semi-annual differential blood counts be made on men working in the Paint Storeroom.

Item 2.

At the present time we have pre-employment examinations of all men going into occupations where there is lead exposure and no man is allowed to enter this work who shows signs of lead poisoning. We have not been doing the blood examinations, but it could be done without added expense, but with some slowing up of employment, which would not affect Shop requirements for men. This plan is therefore recommended.

Item 3.

It is our policy at the present time to comply with suggestions of this paragraph, that is, no man is allowed to resume work involving lead exposure until physical examination and blood examination has determined his fitness. Under this arrangement, these men are transferred to work not involving lead exposure.

Item 1.

This is a good suggestion and the cost will be minimal as it involves less than 10 men. Therefore, we

SOLVENTS

REPORT RECOMMENDATION

Page 48, Item 1, Cont'd.

OUR RECOMMENDATION

Item 1, Cont'd.

concur in this recommendation.

In this connection, Dr. Kronenberg suggests detailed study of men exposed to benzol in the Shop. The use of benzol as a varnish remover has been discontinued which eliminates this problem.

In connection with the study of men exposed to lead and other toxic substances, including solvents, it may be advisable in certain cases to make a more thorough study of blood and, at times urinalyses, in cases where first examinations indicate definite trouble. These cases would be relatively few and the cost low. We are now setting up at our Dispensary laboratory the equipment for analyses of substances for minute quantities of lead and propose to do some of this work in the future.

If we should follow these suggestions, we would keep ourselves informed as to the extent of exposures to our workmen and be in a position to correct improper conditions when found. However, this will probably not eliminate claims for occupational diseases. We anticipate that, regardless of the amount spent in investigation, we will have more and more claims for occupational diseases as time goes on. We will, however, be in good position to make a proper defense of unfair claims before the Industrial Commission.

Office of Mechanical Superintendent.

Chicago - August 19, 1938.

JWL/mk

Summary of investment required, also, increased annual operating expenses at Calumet Shops, involved upon the adoption of recommendations included in Industrial Hygiene Survey, dated April 1st, by Dr. Kronenberg, and as listed in the joint reports of Safety, Medical, and Mechanical Departments, dated August 19, 1933:

<u>Subject</u>	<u>Joint Report Page</u>	<u>Item</u>	<u>Description</u>	<u>Estimated Cost</u>	<u>Estimated Increased Annual Operating Expense</u>	<u>Estimated Annual Saving</u>
DUST	2	4	Install mechanical exhaust systems to all Shop grinding wheels (8).	\$2500.00	\$ 175.00	
DUST	5	16	Purchase asbestos cement in dust-proof paper bags.	---	75.00	
DUST	5	1	Replace obsolete 11 year old dust arrester screens with latest type, Brass Department, Sandblast.	1200.00	---	\$240.00
DUST	6	1	Install fuel oil system to replace present pipe line to Vulcan-Standard Car Mfg. Co.	2400.00	---	400.00
DUST	7	1	Provide partitioned-off space in Cabinet Shop for disc sanding.	250.00	---	
DUST	8	3	Install ventilating hood for stripping mattresses.	135.00	75.00	
METAL FUMES	15	1	Purchase 2 Lincoln fume exhausters for Stall Shop.	225.00	150.00	
METAL FUMES (STALL)	16	1	Purchase 1 pneumatic nut & bolt stripping tool for Truck Shop.	275.00	100.00	
METAL FUMES (BRASS)	16	1	Install brazing booth, Brass Dept.	310.00	50.00	
METAL FUMES (BRASS)	16	2	Install Lincoln fume exhauster for bunk welding.	95.00	75.00	
METAL FUMES (IRON)	17	1	Install 3 Lincoln fume exhausters for Welding Shop.	310.00	210.00	

Summary of investment required, and annual operating expense, Cont'd.

Subject	Joint Report Page	Item	Description	Estimated Cost	Estimated Annual Operating Expense	Estimated Annual Saving
PERSONAL RESPIRATORY PROTECTION	22 - 23	5	Provide room with equipment, attendant, for issuing and maintaining respirators, masks, etc., including duplicate set of respirators.	\$1200.00	\$ 500.00	
ACIDS - ALKALIES	25	1 - 2 3	Rearrangement of plating room and installing local exhaust ventilating system.	9500.00	1500.00	
ACIDS - ALKALIES	26	1	Install local exhaust ventilating system, Glass Department.	350.00	85.00	
SANITIZATION	31-32-33	3	Additional shower, washroom, locker facilities.	29000.00	2000.00	
MEDICAL - Setting up Permanent Hygiene Program	35		Laboratory analyses, toxic substances, dust, gases, fumes (by outside laboratories)	---	300.00	
MEDICAL - LEAD	36 - 37		Employment of laboratory technician at Dispensary; blood examinations & other tests used in occupational disease surveys.	---	1500.00	
TOTAL				947,800.00	\$7295.00	\$640.00
					less 640.00	
				Net Increase		\$655.00

NOTE: The above increased operating expenses do not include the value of the time lost by an average of 150 men during quarterly examinations, tests, etc, which is estimated at \$800.00 per year.